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Rock Products

With which is Incorporated **CEMENT and ENGINEERING NEWS** Founded 1896

Chicago, March 20, 1926 (*Issued Every Other Week*) Volume XXIX, No. 6

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These two 8-ton Plymouths are not only saving the Whiterock Quarries $10.00 a day in fuel consumption, but they are doing the same work that formerly required two 20-ton steamers. That means—no coal or water to haul, no firing up, no boiler troubles, no "stand by" expense.

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RAY C. HOLL
GENERAL MANAGER

The Fate-Root-Heath Co.,
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Gentlemen:-

Our two 8-ton Plymouth Gasolene Locomotives are doing work that formerly required two 20 ton steam locomotives and are doing it with a saving of approximately five dollars per day in fuel consumption alone for each locomotive.

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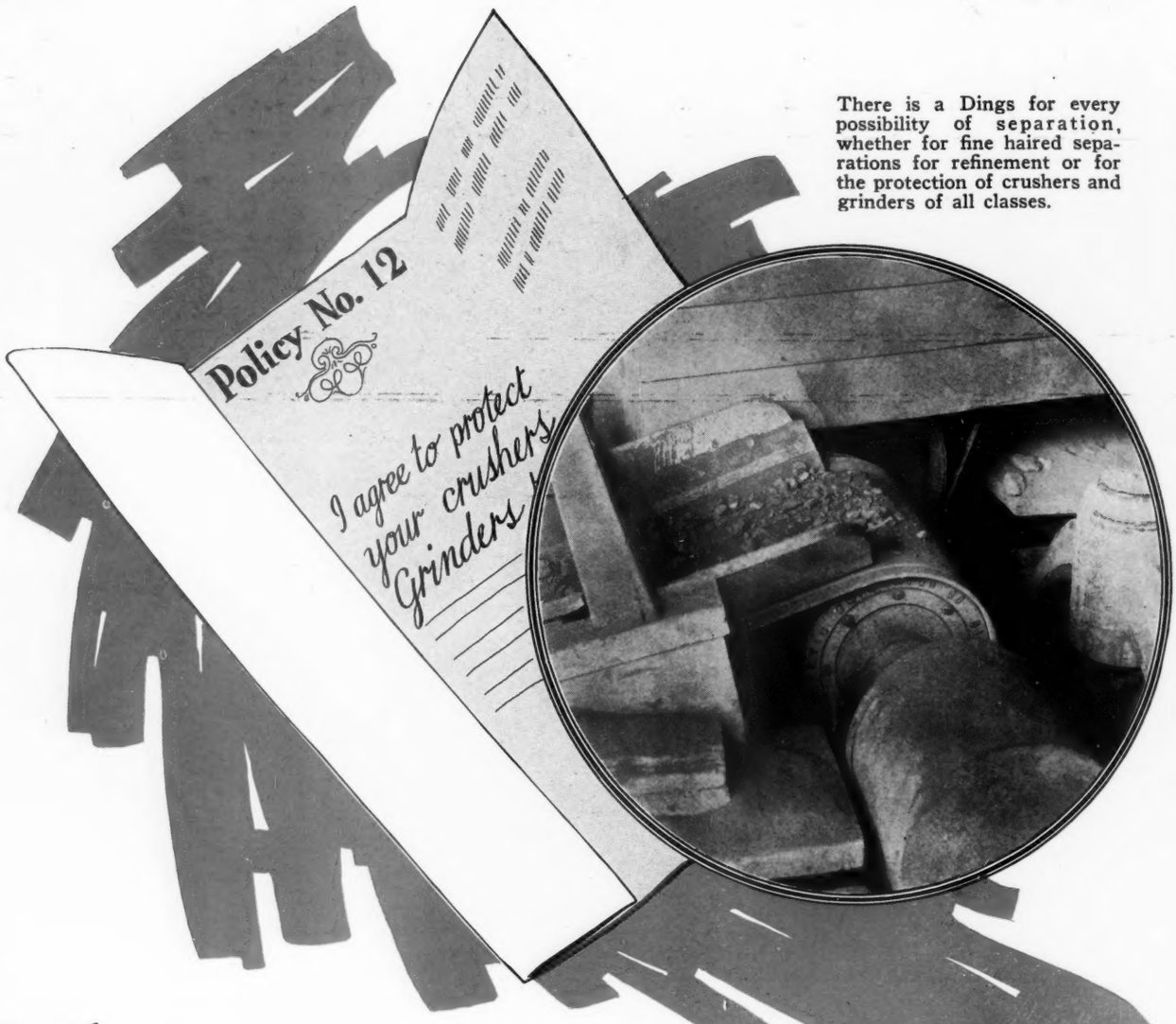

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Rock Products
CEMENT and ENGINEERING NEWS
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Volume XXIX | Chicago, March 20, 1926 | Number 6

Dixie Portland Cement Company Takes Another Step Towards Modernization

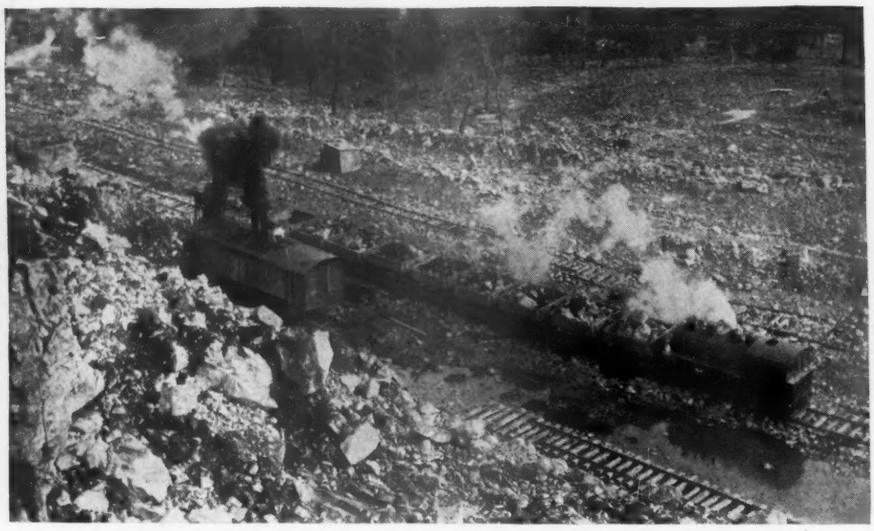
The Latest Improvements Include Complete Change of Major Electrical Equipment Involving the Abandonment of Own Power Plant — Crushing Plant — Next Step Is New and Bigger Kilns

By George M. Earnshaw
Central Representative, Rock Products

IN the May 19, 1923, issue of ROCK PRODUCTS there appeared an article describing the Dixie Portland Cement Co.'s new crushing plant and recently developed quarry at Richard City, Tenn. The building of the crushing plant was the first step towards the complete modernization of the plant. Since that time the company has made many changes and within the past eighteen months has expended more than one million dollars for the installation of major electrical equipment throughout the plant and for the remodeling of the raw-grinding department.

The changes in the electrical layout were incident to the purchase of power. A large part of the company's power equipment was obsolete and the increased capacity of the plant made the entire plant inadequate. In

General view of Dixie Portland Cement Co.'s plant at Richard City, Tenn.



A train of mine cars of raw material on its way to the crushers. Each car holds 10 tons

Quarrying of the 20-ft. shale deposit which underlies the stone is carried on in a separate operation

view of the favorable power rate and the excellent service available from the Tennessee Power Co., it was therefore decided to purchase power and hold the existing power plant as a standby. The purchased power comes over a 44,000-volt line direct from the Hales-Barr station of the Tennessee Power Co., which is about 18 miles from Richard City.

All the electrical equipment was operated on direct-current. With purchased a.c. power, it was decided only the major units should be replaced with 2200-v. a.c. motors. These included 11 super-synchronous units ranging in size from 250- to 500-h.p., and four induction motors, two of 75-h.p. and two of 200-h.p. (The latter drive the primary and secondary crushers.)

Whereas, it would ordinarily have been advisable to reduce the number of d.c. motors to a minimum, it was necessary in this instance to maintain all of the small d.c. units in order to take full advantage of the existing 220-v. d.c. steam plant.

At present these d.c. units are supplied with power from three 500-k.w. synchronous motor generator sets, but in case of any emergency arising causing stoppage or diminution in the supply of purchased power, these three units, as well as the 150-k.w. exciter motor-generator set, are arranged for inverted operation. In this manner the existing steam plant, if started up again, would be able to carry, besides all of the small d.c. units, quite a load of large 2200-v. a.c. motors.

These four motor-generator sets were furnished by the Electric Machinery Manufacturing Co., Minneapolis, Minn.; the balance of the new electrical equipment (the new motors and the two switchboards, both a.c. and d.c.) by the General Electric Co.

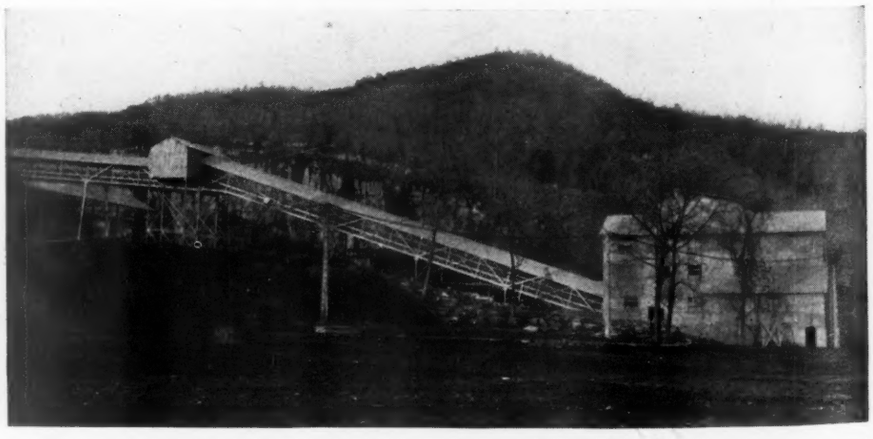
Since the time of the writer's visit at Richard City in 1923, the quarry has been developed into a most excellent operation. Its face is now approximately 1500 ft. long, with an average height of 70 ft., although in one place it is 98 ft. high. It is operated by two Model 60 Marion shovels on rails; Keystone and Cyclone blast-hole drills; 10-ton steel dump cars, and a fleet of three 35-ton Porter locomotives. All trackage is standard gage. Underlying the stone is a 20-ft. deposit of shale, worked separately by a Model 36 Marion on crawlers. There is no stripping at all, so that the operation is without the usual grief found at most quarries.

Raw Grinding Department

In our previous article we described only the quarry, crushing plant, and storage. Since then the old raw grinding department has been completely remodeled and is now one of the most modern in existence. Stone and shale are given a preliminary mixing as they are fed from storage to the belts serving the raw plant. This is accomplished by Smidth cradle feeders, each powered by a 3-h.p. variable-speed G.-E. motor. A fairly accurate regulation of the blend is effected at this point because the feeders are, of course, adjustable.

Two belts carry the raw materials to the plant at an inclination of about 17 deg. Each discharges into its own hammer mill, both of which are the Pennsylvania, size SXT-46, each direct-connected to a 75-h.p. G.-E. induction motor through a flexible coupling.

The second reduction in the raw plant is done by two No. 106 Smidth kominuters. These are each driven by a 300-h.p. super-synchronous motor, operating at 150 r.p.m., remote controlled. On the floor above are



New crushing plant and conveyors to storage. Abandoned quarry appears in background

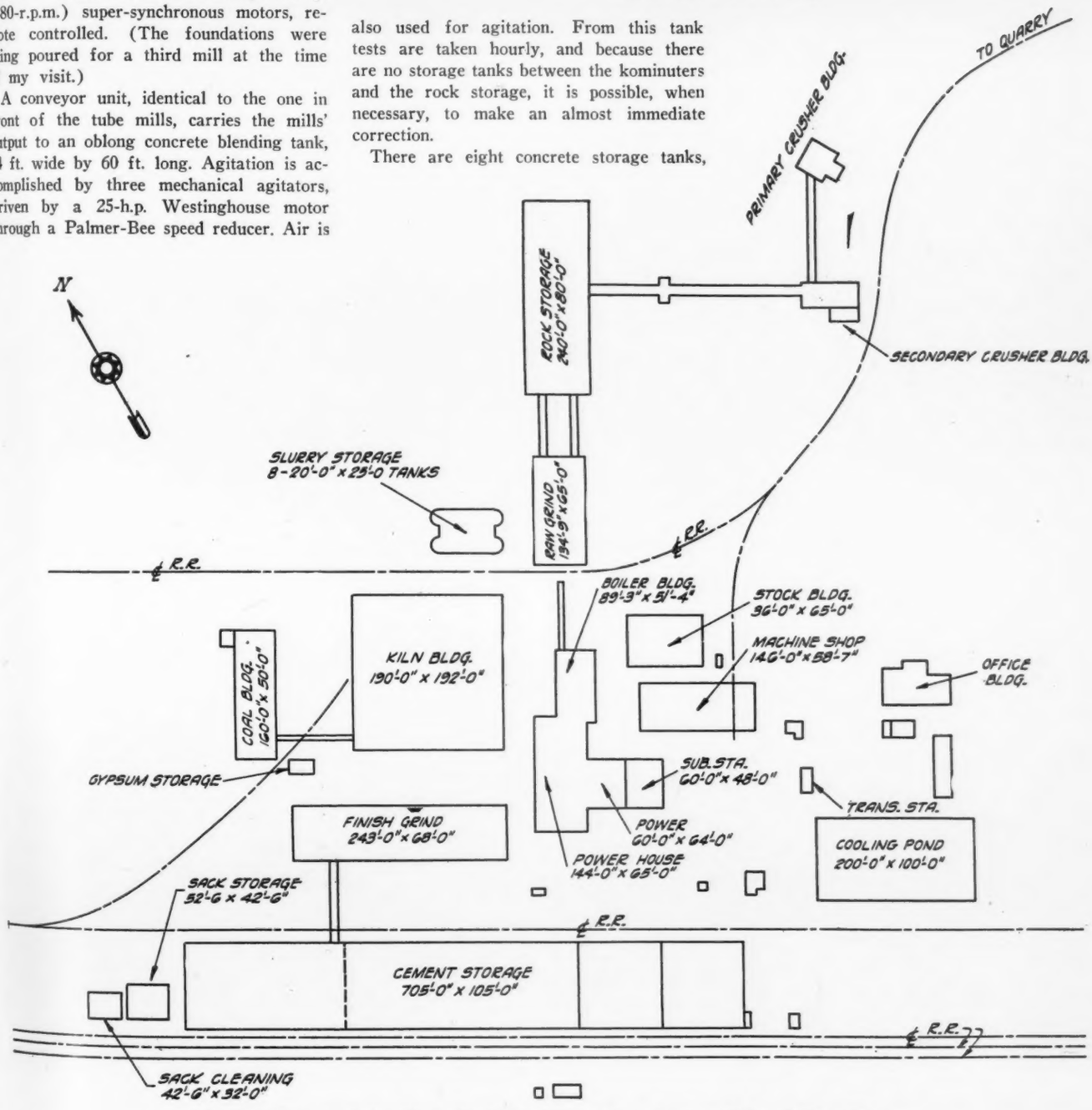
located two No. 15 Trix separators, the material being moved to them from the kominuters by chain-bucket elevators. Rejections are returned to the kominuters by gravity. Each separator is driven by a 22½-h.p. Allis-Chalmers motor, and from these motors are also driven the elevators, through home-made speed reducers. (It should be mentioned here that most of the speed reducers, gears, pinions, and other machine shop products in the plant were made right in the company's own well-equipped shop.)

From the Trix separators the slurry is handled by an 18-in. Weller spiral conveyor, 60 ft. long, driven by a 10-h.p. Westinghouse motor through a Foote speed reducer. The spiral empties directly into a steel trough serving the two tube mills. The mills are No. 20 Smidths and are driven by 500-h.p. (180-r.p.m.) super-synchronous motors, remote controlled. (The foundations were being poured for a third mill at the time of my visit.)

A conveyor unit, identical to the one in front of the tube mills, carries the mills' output to an oblong concrete blending tank, 24 ft. wide by 60 ft. long. Agitation is accomplished by three mechanical agitators, driven by a 25-h.p. Westinghouse motor through a Palmer-Bee speed reducer. Air is also used for agitation. From this tank tests are taken hourly, and because there are no storage tanks between the kominuters and the rock storage, it is possible, when necessary, to make an almost immediate correction.

There are eight concrete storage tanks,

Stone and shale storage



General layout of the Dixie Portland Cement Co. plant at Richard City, Tenn.

Interior of raw material storage. Removal is by underground conveyors

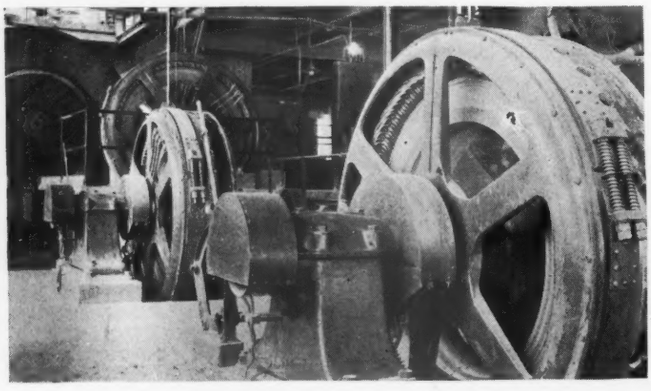
each 20 ft. in diameter, 25 ft. high. The slurry is pumped to them by two 4-in. Allis-Chalmers centrifugal sand pumps having a combined capacity of 750 g.p.m. They are each direct connected to a 30-h.p. Allis-Chalmers motor. The two pumps which remove the slurry from the storage tanks are identical to those at the blending tank and the removal lines of the tanks are so arranged that either pump can pump from any one or more of the eight tanks. Agitation is accomplished here also by home-made mechanical agitators, driven by a 40-h.p. Westinghouse motor.

From the storage tanks the slurry is pumped to two 18 x 40 ft. x 15 ft. deep, mixing basins, equipped with mechanical agitators. From the basins it is boosted to a small steel kiln-feed tank by three Smidth vertical pumps driven by 50-h.p. (700 r.p.m.) Allis-Chalmers motors. (This motor also drives the agitators in the mixing basins.)

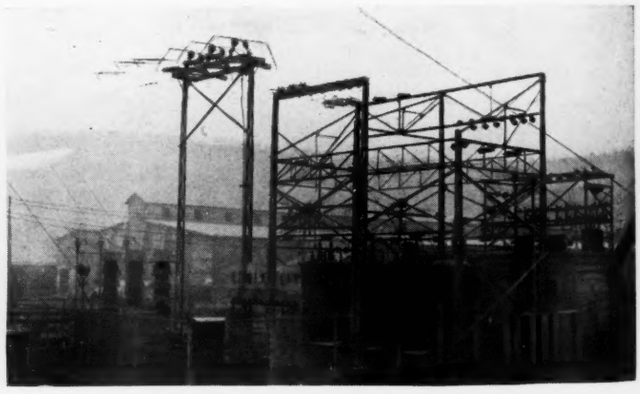
There are ten kilns, 8 ft. in diameter by 110 ft. long, belt-driven by 30-h.p. variable speed motors. Their speed is 1 r.p.2½m. The kilns have been in constant service since the original plant was built many years ago. It has been definitely decided, however, to install two modern kilns, which, officials of the company say, will probably be the largest ever installed in a cement plant in this country. Gradually it is hoped that larger kilns will be installed until all of the small ones have been taken out.

Beyond the kilns are four 5x50-ft. coolers and 12 steel clinker tanks, filled by chain-bucket elevators. A battery of eighteen 30-in. Griffin mills originally driven from one steam-engine driven line shaft is now divided into three sections, each in turn driven by a 300-h.p. super-synchronous, 3-bearing motor. The clinker is moved from the tanks to the mills by 7-in. spirals; 16-in. spirals and chain-bucket elevators convey the Griffin mills' output to steel tanks over the finish grinding mills. There are three No. 18 Smidth tube mills in the finish grinding department, driven by 250-h.p. (150 r.p.m.) super-synchronous motors.

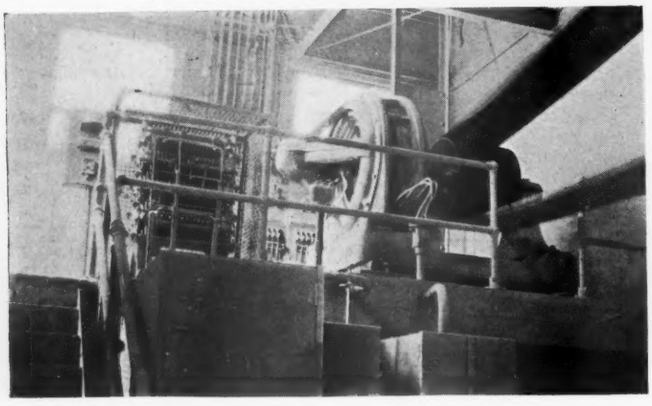
A 28-in. belt conveyor of approximately 225-ft. centers conveys the finished product to the warehouse, which has a capacity of 225,000 bbl.; it also is a part of the original plant. A battery of four 4-valve Bates packers, served by hopper-bottom steel tanks, take care of the sacking. Filled sacks are



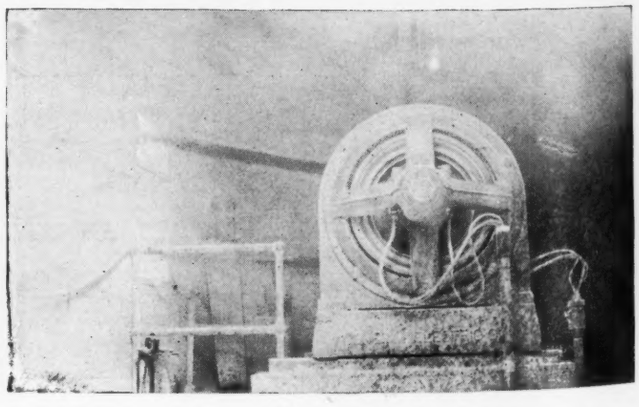
Two 500-h.p. super-synchronous motors that drive the raw grind tube mills



Transformers used for stepping down 44,000 volts to 2300



One of the fourteen 200-h.p. a.c. induction motors used to drive the crushers



Another view of one of the 200-h.p. a.c. induction motors which replaced the d.c. motors

trucked by hand to the cars. It is expected, officials say, that in due time many changes will be made in addition to the installation of new and bigger kilns. It is now almost a certainty that silos and a modern pack house will be erected reasonably soon.

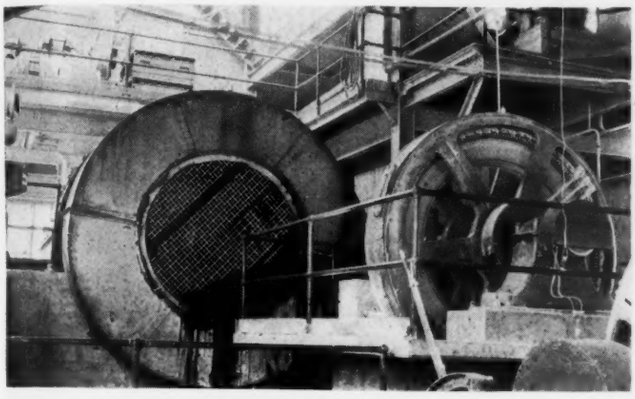
Regarding the electrical layout, certain special features, departing somewhat from standard practice may be of interest.

With the exception of the two 75-h.p. motors for the hammer mills ahead of the No. 106 kominuters and the two 200-h.p. motors for the crushing plant, which are controlled locally by means of push button type of automatic starters, the ten 2200-v. super-synchronous motors already mentioned are all centrally controlled and excited from the power house.

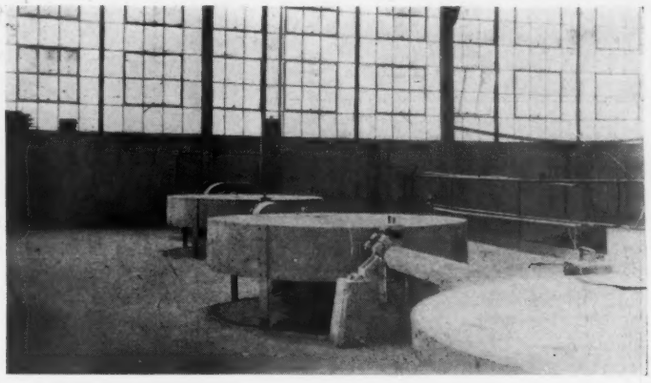
Each of these motors has its own combined feeder and starting panel as well as its own feeder, excitation, and signal cables. By this arrangement all of the switch gear subject to wear, adjustment, and periodical inspection is concentrated in the power house under ideal conditions not readily duplicated by isolated control panels.

The starting is done by the same men day out and day in; the excitation and power factor of these units are under full control. The unauthorized starting of heavy units is eliminated. This feature alone is worth a whole lot in all cases where power is purchased with a substantial maximum demand charge, and experience in other plants, where this control arrangement has been tried out for several years, has proved this. It has also been found that with this arrangement the ratio between maximum demand and average demand may be kept at a very high value with consequent savings in power.

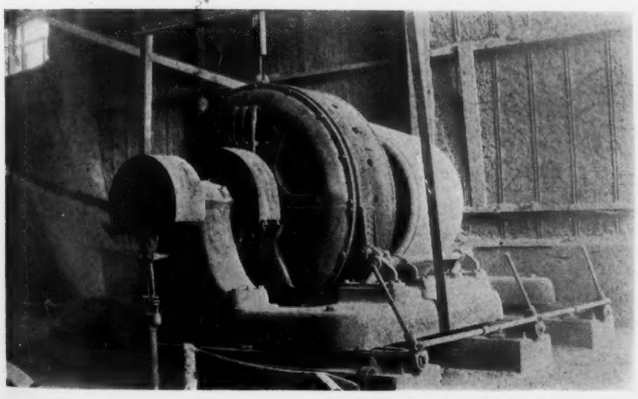
The busses of the main a.c. switchboard are normally divided in three sections. This



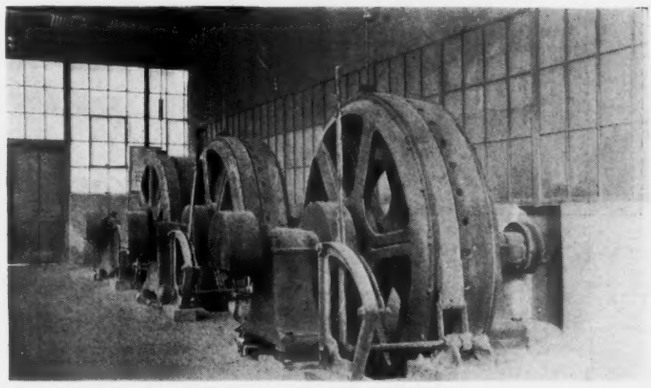
One of kominuters and its 300-h.p. super-synchronous motor



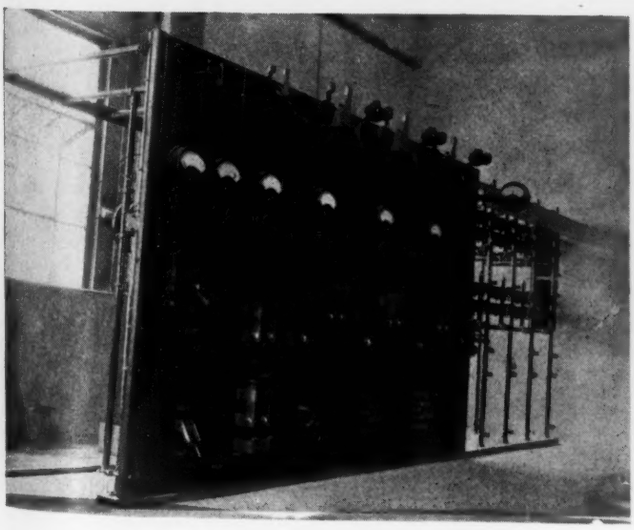
Agitators made in the company's own machine shop



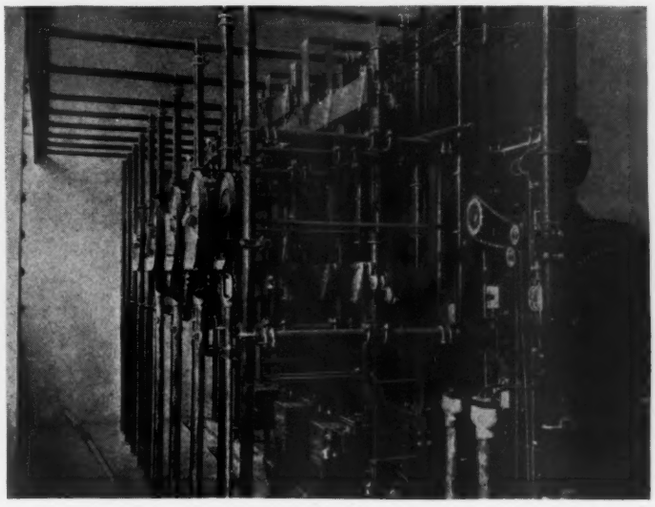
One of the three 300-h.p. motors which drive the mills



The 250-h.p. super-synchronous motors on finish mills

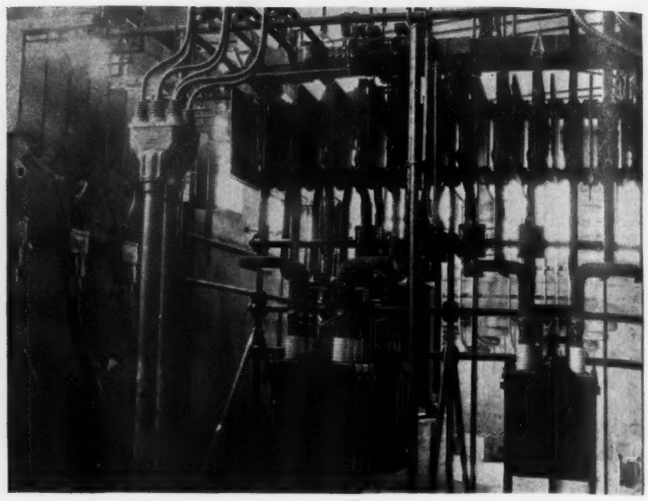


Front view of direct current switchboard

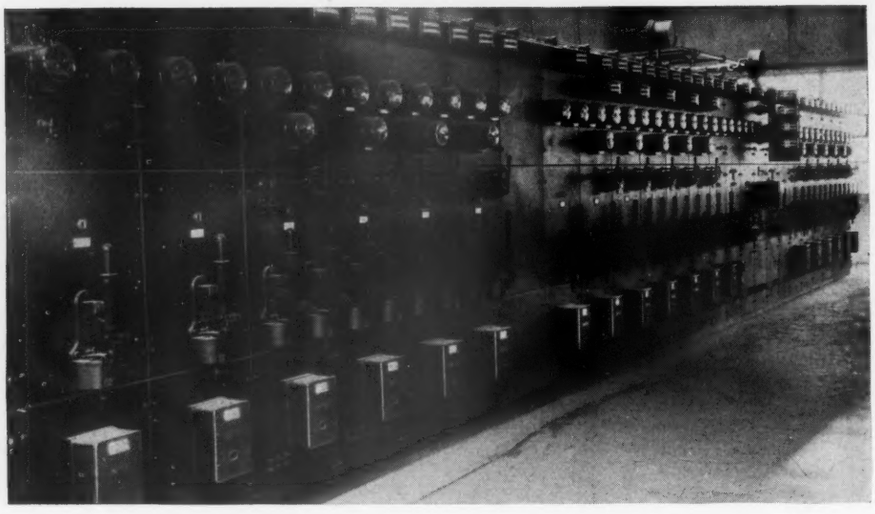


Direct current switchboard from the rear

View of power house showing motor generator set No. 1



Main oil circuit breakers for three bus sections



The new switchboard which carries all of the new big units

arrangement affords maximum protection for the smaller oil circuit breakers of the individual synchronous motor panels and permits localization of interruptions due to short circuits. Each of the three bus sections are protected with a main circuit breaker and a current limiting reactor.

Reduced voltage starting busses extend for the entire length of the a.c. switchboard, and are fed by two high efficiency oil insulated compensators of which one, however, is kept as a spare. This arrangement is considered more efficient and reliable than the customary use of a number of small individual starting compensators which will not stand up when special conditions should require repeated starting of heavy units.

Each motor and feeder panel has a starting and running oil circuit breaker of standard design mechanically interlocked. The signal system between each feeder panel and signal panel at the motor in the mill consists of the following parts: A red bull's eye on the feeder panel in series with a red light and a signal button on the mill panel is for signaling from the mill to the power house. Another, but green, signal light on the mill panel in series with a green bull's eye and signal button on the feeder panel is used for return signals. A Klaxon horn in the power house and the mill department is used for calling attention to incoming signals. Finally, the signal panel in the mill is equipped with a watt-meter to show the mill operator the load and a clear light to indicate when the motor is ready to receive the load. An emergency stop button is also provided so as to permit instantaneous tripping of the breaker in the power house.

Whereas this signal system, developed by the electrical department of F. L. Smidth and Co., may appear complicated when described, several years of experience in other plants has proven its success. There is a total absence of 2200-v. switch gear in the various mill departments.

The consulting engineering on all of the recent electrical changes and improvements was by Viggo Sahmel of F. L. Smidth & Co., New York City, with the aid of Messrs. Klein, Walker and Hardy of the plant personnel. The following comprise the operating staff at Richard City: W. H. Klein, general superintendent; A. E. Legg, operating superintendent; Joseph F. Fischer, chemist; J. E. Walker, electrical engineer; C. E. Hardy, engineer; J. R. Guide, master mechanic, and W. E. Keener, quarry superintendent.

Plant office and laboratory. In the rear is the central heating plant

Quarrying Pennsylvania Calcite for Steel and Portland Cement Manufacturers

Annville Stone Company, Palmyra, Has Unusual Conveyor Tunnel for Getting Stone from Quarry to Crusher and Very Economical Operation

By T. T. Lineaweaver
Treasurer, Annville Stone Co., Lebanon, Pa.

OUR QUARRY is located at Palmyra, Penn., on the Reading railroad, and is a practically pure calcite stone, used largely by the portland cement companies of the Lehigh Valley as a mix to increase the lime content of the cement rock.

It is also used by the steel companies as a flux for open-hearth and blast furnaces. A very small proportion is used for general commercial purposes, as the low grade limestones are more easily obtained for these purposes. Owing to the uses of the stone it is not necessary to provide the elaborate sizing equipment generally found at crushed stone plants.

The cement companies pulverize the stone along with the cement rock and are therefore not so much interested in sizing as in clean stone with high calcium carbonate content. The steel mills and blast furnaces, however, desire the stone crushed with the smaller stone and fines eliminated. For these reasons the operation is somewhat simplified as compared with the usual larger commercial crushed-stone plants. In a word, we produce calcium carbonate whereas the other plants prepare sized commercial stone

General view of the quarry of the Annville Stone Co. Pump house and sump appear in center

Top of conveyor tunnel—stone from belt passes through specially designed grizzly and different sizes are chuted into separate cars

with no specification as to analysis.

One of the views shows clearly how we do our stripping, using a ¾-yd. Thew shovel, on traction wheels and Ford dump trucks. For our location we find this more economical and less troublesome than horses and wagons or other means of transportation.

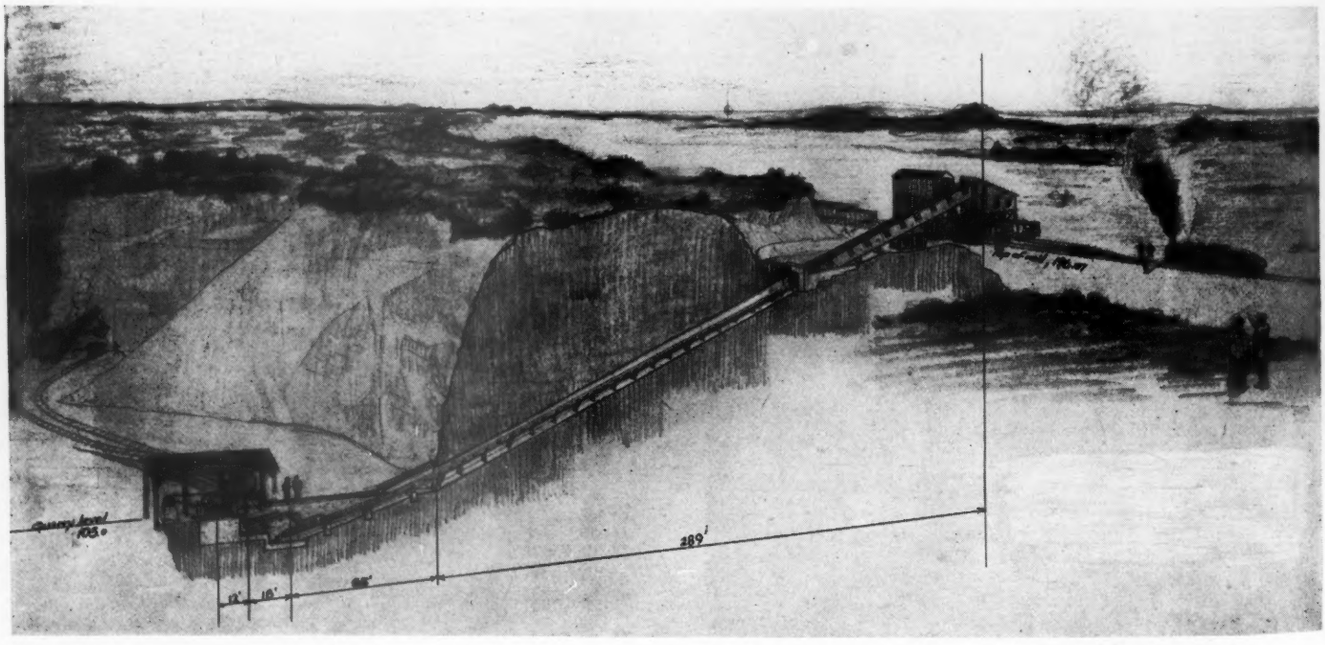
After the stripping shovel finishes, the exposed surface of rock is very irregular, as in the calcite deposit we find the stone at varying depths, some places out-cropping on the surface while 20 or 30 ft. away the stone may have 20 ft. of overburden. Hence we have an incline plane with tracks for hand-loading quarry cars, and these tracks are located at the lowest point of the stripping, and here we conduct a small quarry operation levelling off the floor and in this way we can separate the dirt from the stone by hand work. The idea is to get a solid wall of stone for the main steam shovel operation below this level.

After the surface work, as described above is completed, we have a 70-ft. face of stone, level on top, which enables us to spot our drill holes to the best advantage; but the main purpose is to eliminate the dirt seams near the surface without losing the stone and insuring clean stone for the shovels on the main quarry floor below. We use Loomis Machine Co. electrically-driven "Clipper" well drills, 5⅝-in. hole, with Gill Rock Drill Co. special bits. Our practice is to drill 5 ft. below the quarry floor, and in blasting these holes use about one-third 60% dynamite for the bottom, topping out with two-thirds of 40%. In our primary blasting we use Cordeau exclusively.

For secondary blasting we first block-hole the larger stone, using Ingersoll-Rand "Jackhamers," supplied with air from Ingersoll-Rand motor-driven air compressor. For sharpening Jackhamer bits we use a Hardscog air-driven machine. This shanks and sharpens the drills very quickly with very little for the blacksmith to do in the way of finishing, other than to temper them.

Our stone loading is done with Thew Type A-1 1-yd. steam shovels, caterpillar tread. The quarry tracks are 36-in. gage, 60-lb. rails, and we use large one-way dump cars, the boxes of which we build ourselves out of 3-in. oak planks, lined with ½-in. iron plates. These cars are drawn to the crusher by 7-ton Whitcomb gasoline locomotives and dumped by an electric overhead hoist. At this point we have also a Curtiss air hoist for use in hooking around any stone which may bridge the crusher.

The primary crusher is 40x48-in. Buchanan jaw type, belt-driven by 100-hp. General Electric motor. The crushed stone is chuted to a belt conveyor designed and furnished by the Robins Conveying Belt Co., which is 36 in. wide and 395 ft. long center of tail pulley to center of head pulley. This



System of handling stone from the quarry face to the shipping cars through tunnel in solid rock—the crushing plant is located at the foot of the conveyor tunnel—conveyor housing and structures are all of steel and concrete

belt starts at the crusher horizontally for a distance of about 40 ft.; then on a radius until a pitch of 22 deg. is reached on the incline. This plan permits the stone on the belt to be at rest and somewhat settled before it starts up the pitch.

Our layout did not permit of any less pitch and we were afraid we would have trouble with stone rolling back on the belt, but we find very little trouble in this respect. We use no skirt boards or other device in operating this belt as we do not use of a special shoe or pocket arrangement for each bar, there is opening between the bars on the end so that the flow of stone is not obstructed. It is simple and the best stationary self-cleaning grizzly we have ever seen.

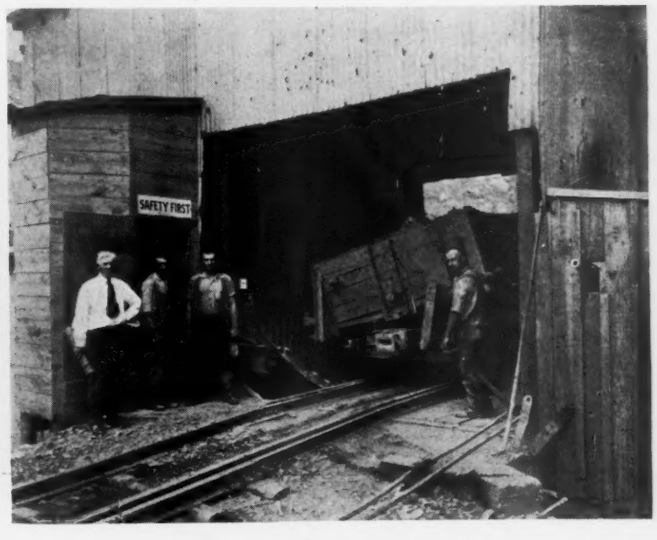
At intervals under this grizzly we have chutes to catch the particular size of stone we desire. The smaller stone near the top of the grizzly until the bars reach an opening of about 3½ in. we divert to a double log washer. Then from 3½ in. to the end of the grizzly where the spread is 6 in. we chute the stone to one railroad car for the cement industry, and the oversize goes to another car on a parallel track. In this way we are able to meet the specifications of our customers.

In spite of the severe operating conditions, the performance of our crusher has been excellent. It will take stone practically as large as the upper opening of the jaws, 40x48 in. We can feed 100 tons per hour for a 10-hr. day. The average production up to the present time has been 700 tons per day, but the crusher and other equipment have a capacity considerably higher than this figure. The quarry face is rapidly being developed so that we will produce a much greater daily tonnage. We operate 10 hr. per day and the plant is artificially lighted so that we can and frequently do run at night. As a rule we run throughout the winter.

Stripping with small shovel on traction wheels loading into dump trucks

Shovels working along two sides of a long narrow quarry face

Loading stone into cars for carriage to crusher



Dumping into primary crusher

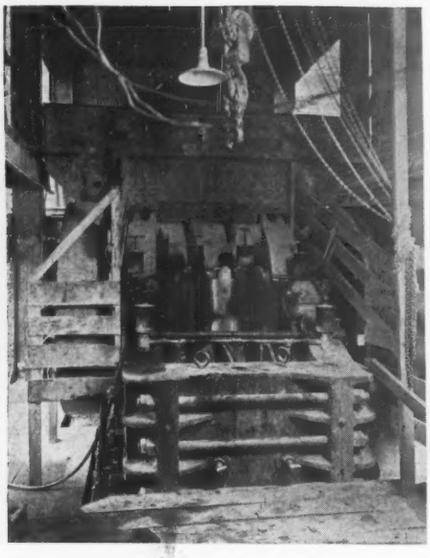
find it necessary. All the stone on this belt is "run of crusher" and discharges to a scalping bar-grizzly of our own design. The bars are plain 1½x5-in. by 10 ft. long, tapered or flared like a fan, 2½ in. wide opening at top and 6 in. at the bottom. This prevents stone wedging between the bars as the stone slips along the bars until it finds opening large enough to drop through. The most important point on this grizzly, however, is that it has no cross bars other than the bottom and here, by the

Crushing Plant Details

The crusher is located in the pit near the center of the quarry. The setting of the crusher jaws is 7 in. The 36-in. conveying belt has a run of 395 ft. through a tunnel cut in solid rock from a point directly beneath the crusher to the surface level. The tunnel is provided with steps on which workmen go in and out of the quarry pit.

Operating Costs

The cost of operating is detailed in the accompanying table. Depreciation is based on a 12-year life which is conservative be-



Electric powered primary crusher

COST OF OPERATING TYPE C, 40x48-IN. BUCHANAN JAW CRUSHER

Depreciation—(cost plus installation expenses):		
Crusher	$10,250.00	
Motor, etc.	1,420.45	
Belt	151.99	
Crusher house	1,650.00	
Foundation	2,305.18	
Construction on hopper	795.46	
Excavating chargeable to crusher	500.00	
Total	$17,073.08 ÷ 12 yr. =	$1,422.76
*Average interest at 6% $= \frac{13}{12} \times \frac{\$17.073.08 \times .06}{2}$		554.88
Estimated annual allowance for repairs and maintenance		500.00
Lubricant cost:		
Atlantic cup grease (bearing cups filled weekly)—50 lb. per week × 52 weeks × 8 cents per lb.		208.00
Black oil for toggles—290 days × 1 gal. per day × 30 cents per gal.		87.00
Oil for driving motor—8 gal. per year × 50 cents per gal.		4.00
Total annual cost for the above items	$2,776.64	
Average daily cost for the above items—$2,776.64 ÷ 290 days	$	9.57
Labor:		
1 man × 10 hours × 45 cents per hour		4.50
1 man × 10 hours × 42½ cents per hour		4.25
Power cost—32.6 kw. × 10 hours × 2.4 cents per kw. hour		7.82
Total cost per day	$	26.14
Average cost per ton of stone going through crusher—$26.14 ÷ 700 tons	$	0.0373

*Allowing for interest earned by depreciation reserve.

cause we ran a Buchanan crusher at our West Lebanon quarry for 15 years and there is no reason why the new crusher should not show equally long life. No actual repairs have been necessary to date and the estimated allowance of $500 for maintenance and repairs is liberal. We are cooling the crusher bearings with water flowing into the pit from the surface level, with no cost for pumping. The time of two men is charged to the crusher.

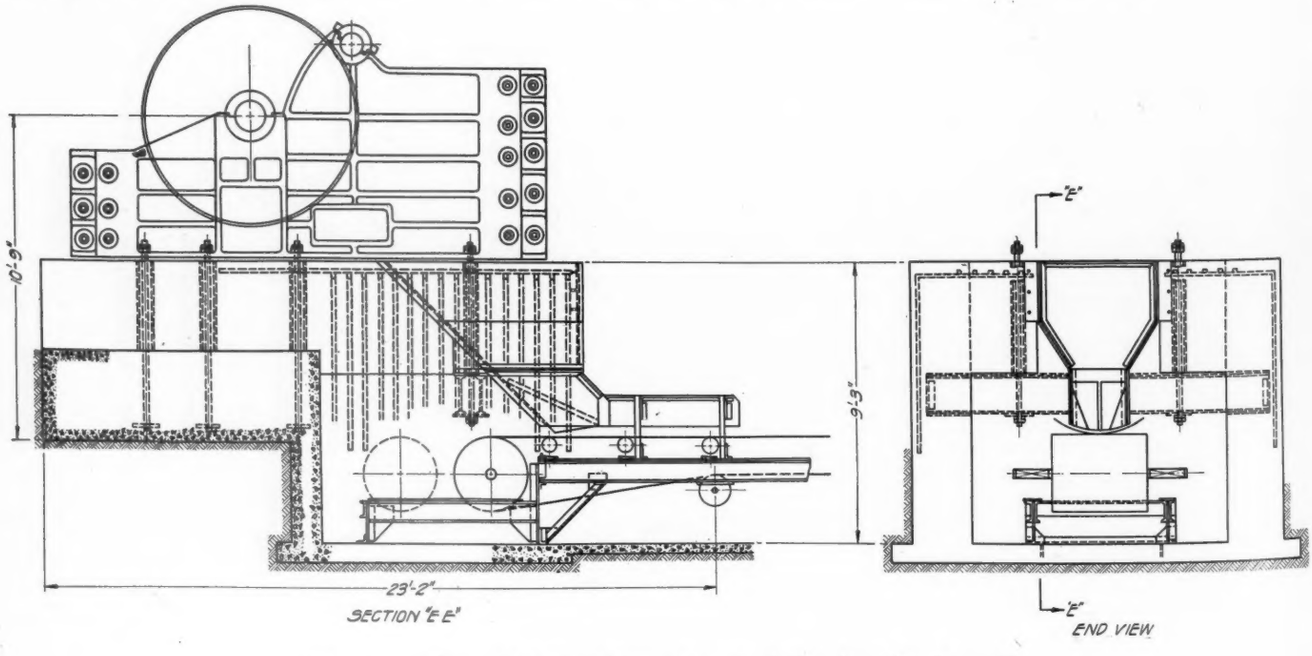
To determine the power consumption of the crusher accurately, tests were made on December 17 and 18 by a representative of the local power company. The power input was measured by means of both indicating and recording wattmeters which showed an average input of 32.6 kw. while crushing was being done at a rate of 700 tons per day. The peak input was 77 kw. Ammeter readings were also taken, showing a maximum peak of 120 amperes, whereas the full load current rating was 135 amperes. The 100-hp. motor is therefore operating at an average load of about 43% of rating with occasional full load peaks.

The total daily cost of operating the crusher amounts to $26.14 per day and on a 700-ton daily production in 10 hr. the cost per ton is 3.73 cents. This figure does not include administrative or overhead expense.

Our quarry operation is below water level and we use a Cameron direct-motor-driven centrifugal pump, operated automatically by float arrangement; and then as a standby or auxiliary we have a much larger pump for emergency or unusual water conditions, but this we have found necessary to use but seldom; nevertheless, we would not feel safe without the second unit. All the water pumped from the quarry sump is utilized in the log washer referred to above.

Our plant is completely equipped electrically with 440-v. motors, stepped down from 23,000-v. primary. Our construction throughout is concrete and steel, and our buildings are brick, concrete and steel. All our wiring is in conduit and the plant well lighted. We frequently operate at night with but little more difficulty than day operation, and get along about as well on rainy days as clear ones. All the men, from the shovel operators to the car dropper, are under cover, but it is necessary on rainy days, of course, to have some handy men to lay-up tracks and do odd jobs; but the few required to be out on these occasions we supply with rubber boots, coats and hats so that they are protected.

We do not claim to have an unusual operation, but have tried to get good permanent construction with equipment of the highest type in the several classes, having in mind standardization, as this is a great advantage in the matter of spare parts, of which we carry a considerable stock.



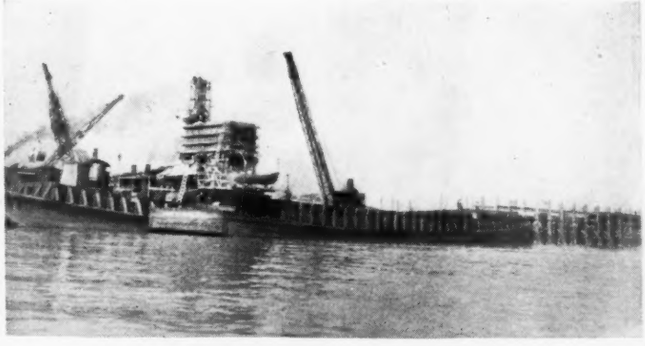
Primary crusher and belt conveyor layout of the Annville Stone Co.

Rock Products Industries Very Active in the South—Outlook Fine

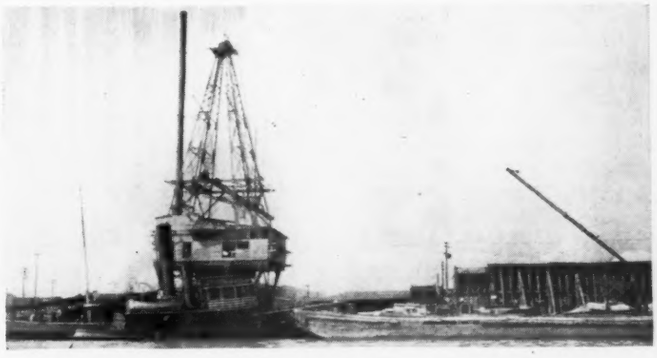
Old Companies Expanding Operations and New Plants Being Built—Many Large Dredges Busy Working River Beds for Sand and Gravel

By Edmund Shaw
Editor, Rock Products

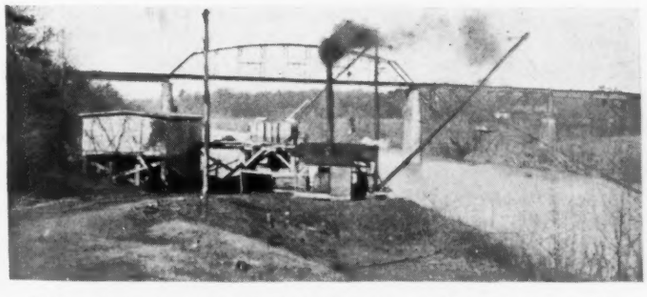
THERE is in America something of the spirit that sent the discoverers of the continent to seek for Eldorados and the Fountain of Youth. A generation ago we were looking for those things in the fertile and unoccupied lands of the west. Today we are looking for them in the sparsely settled coastal plain country on the Gulf of Mexico. Everyone knows of Florida, but few of us have realized that the rush to Florida is only a part of a definite expansion of the population of the country into the south. examples, Mobile is putting $10,000,000 into a new dock, and between Gulfport and Biloxi the longest sea wall in the world, a little over 15 miles in length, is being built. General construction, residences and business buildings, is going on everywhere. One can hardly walk down a street in Mobile without passing piles of building material that is to go in some new structure. Five buildings of the skyscraper kind are going up in New Orleans within a few blocks of the hotel from which this is written. State and land towns of the South that people and money were being drawn from them to Florida. It appears now that the reaction has set in, for the inland towns are building many new structures. I left the coast at Mobile and went north to Birmingham and then by Tuscaloosa, Ala., and Meridian and Hattiesburg, Miss., back to the coast at Gulfport. In all these places there was plenty of building going on, and I was told by the people who should know, the producers and dealers in building material, that what was



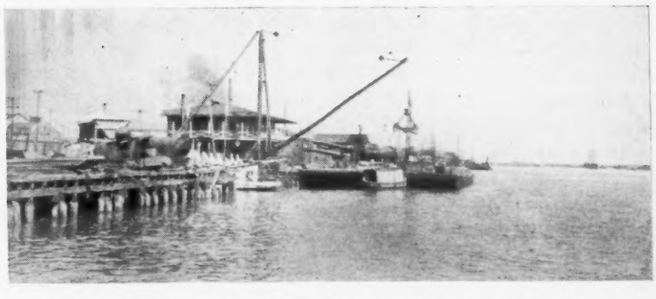
Unloading sand and gravel from the Mobile Gulf and Navigation Co. at the new $10,000,000 state dock at Mobile



Docks and new unloading machine of the Mobile Gulf and Navigation Co.



Unloading plant of the Baker Sand and Gravel Co. on the Warrior river, Tuscaloosa, Ala.



Mobile docks of the Baker Sand and Gravel Co., where transfer to ocean-going vessels is made

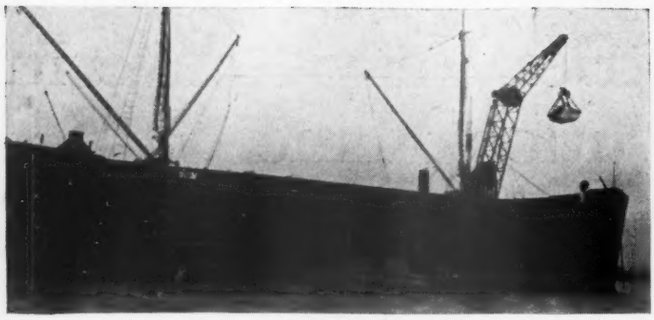
Old towns like Pensacola and Mobile, that had not changed much in a generation, now show an increase in real estate values of 300% in the past two years. In newer places, especially beach and resort towns, the jump in real estate has passed beyond the bounds of reason, as it did in Florida. But underneath the boom and the speculative buying and selling one must admit that there is a solid stratum of progress, evidenced mainly by the building that is going on. For county highway programs and city paving are being pushed and all this means plenty of business for the producers of rock products.

Great Building Activity in Inland Cities

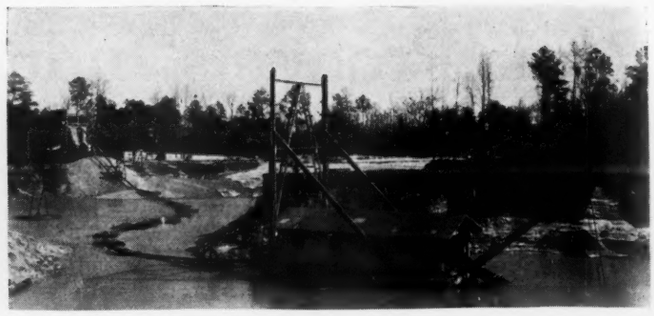
But by no means all of this activity is confined to the towns on the Gulf littoral, or even the greater part of it. Last year there was complaint from some of the inseen in these places was paralleled in many other towns in Alabama and Mississippi. Furthermore, it is expected to continue, not only by real estate operators, but by the shrewd business men who are putting their money into the production of cement, aggregate, and other rock products.

Mobile a Great Aggregate Shipping Point

There is no production of aggregates or



Loading an ocean-going barge with gravel at Mobile



Dredge and plant of the Hattiesburg Sand and Gravel Co.

other rock products at Mobile, but large quantities of such products are shipped from there. The shipping of gravel from Mobile to Florida parts was described in the letter preceding this from the Florida end. At Mobile two companies were found engaging in this business, the Mobile Gulf and Navigation Co. and the Baker Sand and Gravel Co.

Large Dredges Operate on Rivers

The Mobile Gulf and Navigation Co. operates three large dredges on the Tombigbee and Alabama rivers from 40 to 100 miles north of Mobile. All have 18 to 20-in. pumps direct connected to vertical steam engines. The dredging is at an unusual depth, 45 ft., and this requires 60-ft. suctions. As the dredges operate far from towns, they are built with ample quarters for the men who come to town for only an occasional week-end visit. The sand and gravel is loaded on barges and towed into Mobile by tugs which have screw propellers and not the stern wheels usually found on river boats. One of these has a 120-h.p. Diesel engine; the others are all steam-driven. A large fleet of barges is kept in service, and the average tow from the dredge to Mobile is about 18 hours.

The barges are unloaded at the dock by a gantry crane if the material is wanted for local use, and into ocean-going boats by floating derricks, if it is to be sent to Florida. A very large and well-designed unloading machine was being built at the docks when the plant was visited.

It is something of a feat in transportation and marketing to bring a low-priced material like gravel from so far inland to a seaport and to re-ship it in sea-going vessels and land it at a port some hundreds of miles distant at a cost which will permit a profit to be made when it is sold there. Only a large-scale, well-organized business could even attempt such work, and it is a good example of how far the sand and gravel industry has progressed in the last few years. It speaks well for the vision and the enterprise of the company, and especially its manager, R. H. Radcliff, that such business was even undertaken.

Business Carried on Over Wide Territory

The Baker Sand and Gravel Co. is another striking example of carrying on a business over a wide range of territory. It has yards and an office at Mobile, but its headquarters are at Tuscaloosa on the Warrior river. The Warrior is a part of a river system that is navigable for 475 miles, and the Baker company makes shipments over all of it. The head of the concern is Capt. J. E. Baker of Tuscaloosa, who has been identified with much of Alabama's development. He is also at the head of the Baker Coal Co., the Baker Towboat Co., and the Warrior Concrete Co. Three dredges are used for digging gravel, one on the Alabama, one on the Tombigbee, and one on the Warrior. Landings and unloading plants are maintained at Tuscaloosa, River View, Demopolis, and Mobile. A considerable part of the output is shipped to Florida ports, the gravel being transferred from river barges to sea-going boats by floating derricks.

Birmingham the Great Center for Cement Lime and Slag for South

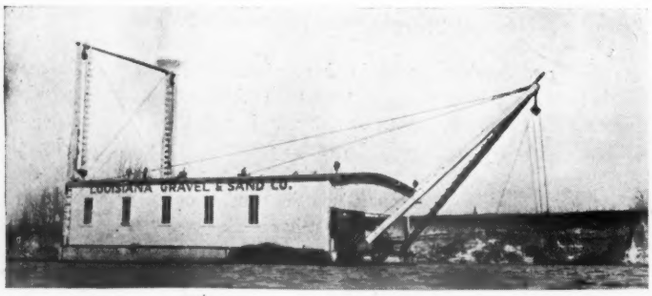
It is fortunate for Birmingham at this time that it is so near to the region where so much building is going on, but it is equally fortunate for this region that it includes Birmingham, from which it may draw its supplies. Birmingham is the great center for the manufacture of both cement and aggregate. It was built up from the deposits of coal and iron in and around it, but its limestone deposits are proving a resource of almost equal value. Indeed, they are as necessary as ore or coal to the running of the furnaces. But they are also the foundation of a great cement and lime business from which shipments are made over much of the south.

Many New Cement Plants Being Built

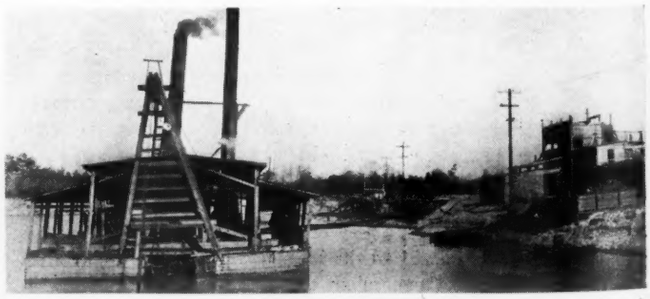
As announced recently in Rock Products, the Phoenix Portland Cement Co. is building a new plant in Birmingham, notable for its 330-ft. kilns and other departures from the usual American practice. Its former plant was sold to the Alabama Cement Co. which now operates it. The Lehigh Portland Cement Co. has a large plant there, and in addition to these, there is the Southern States Portland Cement Co. which makes a slag cement. A great deal of slag cement has been used in concrete road bases in and around Birmingham, and the use of slag cement is said to be increasing.

One wonders where all this cement is to be used, especially when all the new plants which are to be built, and which are building, in the southern states are completed. In Florida the Lehigh is building at Ocala and the Cowham interests at Tampa. A new plant is proposed for St. Stephens, north of Mobile, construction of which has not yet started, but it is reported that a contract has been let. The International, as the Louisiana Portland Cement Co., is building at New Orleans.

Besides the Birmingham plants, there is the Gulf States Portland Cement Co. at



New electric dredge of the Louisiana Gravel and Sand Co., Hattiesburg, Miss.



Old steam dredge used for relay pumping and plant of the Louisiana Gravel and Sand Co.

East Birmingham plant of the Woodstock Slag Corp.

Woodward crushing plant of the Woodstock Slag Corp.

Demopolis, Ala., that makes the Warrior brand, much used in and around Mobile, and there are plants at Chattanooga, Nashville, and other places which ship into this territory. Then there is the competition at port towns from foreign cement. Belgian cement is brought into Gulfport and New Orleans by shiploads and other parts have been getting it, too.

Future Market for Cement Appears Good

I ventured the opinion, to a man who is interested in one of the large cement plants, that all this looked like too much cement for the people who were to use it. He did not seem to be in the least worried about the market of the future. It is his belief that we are just beginning to use cement in the United States. If every state should use it as California does, the consumption would be doubled. We have used it mainly in large and heavy construction, but we are beginning to use a lot of it in smaller construction. In a region where new development is going on, where local materials must be used as much as possible, and where speed is important in building, concrete is the logical material and more and more of it will be used.

I suppose that few of us really appreciate the possibilities there are for the use of

New plant of the Birmingham Slag Co. at the Alice furnace

G. A. Mattison, Jr., vice-president and general manager, Woodstock Slag Corp.

cement in the future, especially in cement products. One plant in Birmingham uses a carload of cement a day; a dozen such would keep a fair-sized cement plant going. The 234 products plants in Florida must use an enormous amount of cement. One high school building in Mobile took 300,325 block, and G. A. Toulmin, who had the contract, set up a full sized plant on the ground to make them, and saved considerable in trucking costs. Just recently I have heard of an order for 200,000 tile and another for 95,000 tile. Evidently the products business in the south will of itself account for a good sized cement production.

Slag Plants Increasing Capacity

Birmingham sends out a lot of the aggregate to go along with the cement. The Birmingham Slag Co. has added two new plants since I was in the city last, one at Bessemer and one at the Alice furnace, not far from the city. This is a small plant because the slag production is not large, but it is a beautifully designed and constructed plant, steel throughout, and a model of compactness. It is unusual in that it has Link-Belt vibrating screens and no revolving screen. The Bessemer plant has revolving screens and is of somewhat larger capacity. It is also of steel construction throughout and of a compact and simple design.

The Birmingham Slag Co. has made important improvements in its older plants at Ensley and Alabama City. The most striking improvement perhaps is the addition of a 120-ton Marion electric shovel. This big machine has four caterpillar treads instead of the usual two, and a 100-ft. swing. At the Alabama City plant a new high-speed crusher of the suspended type, made by Allis-Chalmers, has just been installed.

Birmingham slag is having a wonderful influence in the development of the south. In a region where good road building material and products aggregate is generally scarce, it has been of incalculable value. The thing that really opened Florida to the tourist was the building of good roads, and the solution of the road problem in that state was the road base of soft limestone with a wearing surface of Birmingham slag, with a bituminous binder. Over a considerable area it is the only aggregate obtainable in large quantity. As a products aggregate it goes into districts even where other aggregates are obtainable on account of its lighter weight.

The Woodstock Slag Corp. is another large shipper of slag from the Birmingham district and it has a comparatively new plant

New plant of the Birmingham Slag Co. at Bessemer, Ala.

at Woodward, producing about 2000 tons daily. An excellent feature of this plant is the large bin before the primary crusher. The situation was such that the bin could be included in the plans without loss of headroom, and it is an advantage in keeping the plant running steadily. This company ships a great deal of slag from a bank which it works like a quarry, drilling with churn drills and shooting down the slag in benches. It has also another crushing plant at East Birmingham. More detailed accounts of the slag crushing plants mentioned will be published shortly.

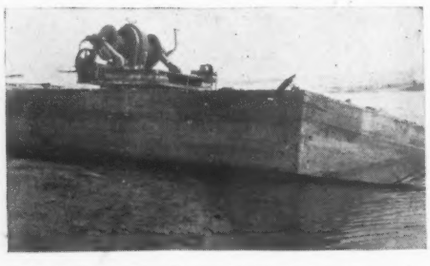
Hattiesburg, Miss., the Sand and Gravel Production Center

Hattiesburg, Miss., is the center of a sand and gravel production which has been going

Recently built dredge of the American Sand and Gravel Co., Hattiesburg

on for a good many years, to judge by the size of the ponds left by the dredges. But it has recently taken on a spurt that has placed it among the important producing centers of the country. Formerly there were two companies producing and now there are five. All five have new equipment or are building new equipment and practically all the machinery is now electrically driven. This enlargement of the industry has taken place in little more than a year.

There are three producing areas around Hattiesburg, to the north, east and south of the city, all about the same distance from the town, two to two and one-half miles. All the operations have a certain similarity. Ten-inch "Amsco" pumps, belt-driven, are used in all the dredges but that of the Hattiesburg Sand and Gravel Co., which has a Pettibone-Mulliken "Diamond" pump direct-connected to a 350-h.p. Allis-Chalmers variable speed motor. The screening plants are much the same and very simple in design



Hull of the New Inland Sand and Gravel Co.'s dredge which was burned a short time ago

G. C. McCullough, vice-president and general manager, Birmingham Slag Co.

as only two products are usually made, gravel and sand. The Louisiana Gravel and Sand Co. makes two sizes of sand and occasionally two of gravel, and the other plants can do the same when the market demands these sizes.

The Louisiana company has a fine new electric dredge which has the largest hull in the field, made necessary by the use of a 65-ft. suction. This pumps to an older steam dredge now used as a relay. The screening plant of this company is somewhat more elaborately built than the others in the field and classification is used to separate the sand into two sizes. I. V. Austin is manager of this company.

The Hattiesburg company mentioned above has its plant near that of the Louisiana company, and it is one of the two companies of which J. J. Haney is manager. The other is the New Inland Sand and Gravel Co., which has its plant to the south of the town. At present this company is producing only sand, repumped from the sand that was wasted while pumping for gravel. The gravel dredge burned late last year and a new dredge is now being built.

The American Sand and Gravel Co. is a new concern with ground not far from that of the New Inland company's workings. The dredge had just been completed and the screening plant was being built on the day that I visited it, so of course there had been no production as yet. The dredge is about as well designed and built as any small dredge I remember seeing. S. O. Trest is the manager of the company.

The Concrete Gravel Co., which is working east of Hattiesburg has a history that illustrates how the industry has grown lately. This is a partnership and not an incorporated company, and about a year ago the partners went into business in an experimental way, using a 6-in. pump on skids on the ground. The business soon grew to where the 6-in. pump could not produce enough and the present 10-in. dredge was built and put in service. H. M. Willis acts as manager of the company, and another partner, L. L. Smith, is in charge of operations at the plant.

New Sea Wall Takes Considerable Aggregate

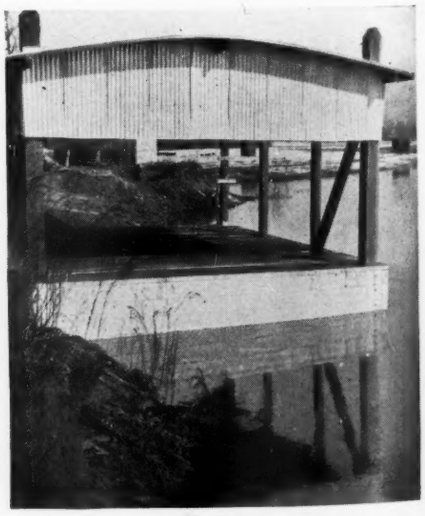
A considerable market for the Hattiesburg sand and gravel is found at Gulfport and Biloxi, where the big sea wall is building, and much general construction is going on. But by no means all of it is consumed there, as shipments are being made to Meridian, Jackson, Natchez, Vicksburg, and other towns in the shipping radius.

Building Activities Create Demand for Lime and Gypsum

Lime and gypsum are being used in great quantity, of course, with so much building going on. Here at New Orleans I am told that a considerable amount of the lime used comes from Arkansas, but farther east the lime comes from the district just south of

Screening plant of the Concrete Gravel Co., Hattiesburg. Construction is typical of this district.

Birmingham, where several plants are producing. I did not find time to visit the plant, but I called on Henry Burgess, secretary-treasurer of the Alabama Lime and Stone Co., who said that his company was making many improvements. A new track has been built



Hull of new dredge being built by the New Inland Sand and Gravel Co. at Hattiesburg

from the town of Calera to the plant which is now running day and night shifts. A new Bucyrus C-70 shovel had just been bought and a Sanderson Cyclone drill, also a number of Western side-dump cars. This company has two quarries, one of dolomite and one of high calcium limestone, and makes both chemical lime and finishing hydrate. R. M. McDonough is president of the company and John Confer, who left the company for a time, has returned to take charge of the plant operations.

I was told that the Saginaw company, which is in the same district, is developing a new quarry.

Here in New Orleans, the big thing in the rock products line is the building of the Louisiana Portland Cement Co.'s plant. This will add one more to the number of cement plants that are built in big cities as this is right in the city of New Orleans, on the banks of the Industrial Canal. The situation will give it exceptional shipping facilities. As ROCK PRODUCTS readers know, this plant is to use the sediment from the filtration plants of the city water supply, adding oyster shells to make up the deficiency in lime. The work going on now consists of driving piles and pouring some foundations for the smaller buildings. Everything, as with all structures of importance in New Orleans, must be carried on piles, which hold by skin friction, and several thousand of them will be necessary to hold the plant.

Concrete piles are not so good as wooden piles for this work as the weight of the concrete reduces their efficiency to hold up loads. Also the skin friction is greater on the wooden pile than the concrete pile. There is a problem here for the enterprising concrete pile manufacturer to work out. One solution might be to use hollow concrete pile made by the Hume system or some other centrifugal method which would be very strong and light and would have a greater area of contact with the soil.

Lightweight Building Units in Use

The bearing limit of the soil here was said by one contractor to be about 1000 lb. to the square foot, while another thought that 700 lb. should not be exceeded. So lightweight materials are especially desirable and lightweight cement block are being made. I saw some cinder tile, 6x8x12-in., made with thin walls, that weighed less than 10 lb. when they were dried out. A curiosity in blocks was one made of burned rice chaff. It weighed about the same as the cinder block.

Steel construction for large buildings has been preferred to concrete construction because it may be better designed to keep down the weight. But concrete gets in just the same. A building going up just now has the lower eleven stories of steel construction and the upper six stories of reinforced concrete.

The Jahncke Service, Inc., is the largest producer of sand and gravel in this part of the country, and its operations have been described some time ago in this paper. With its steel and concrete construction, all electric drives, and thoroughly modern equipment, it stands high among the better plants in the United States. The company has a very complete yard with a traveling crane for handling sand and gravel in New Orleans.

A considerable quantity of sand and gravel comes in from Logtown, Miss., about 40 miles away on the Pearl river, and from Monroe and Alexandria, Miss., to the northwest. It is the intention to describe these plants a little later.

More Than a Billion Dollars for Rural Roads in 1926

HIGHWAY construction and maintenance in 1926 will equal and possibly exceed the progress made in any other year, according to estimates from the various states compiled by the Bureau of Public Roads of the United States Department of Agriculture. A total of $1,030,286,948 is available for the construction and maintenance of all rural roads.

Fifty-eight per cent or $598,590,948 is to be available to the state highway departments, of which $461,515,400 is for construction and $137,075,548 for maintenance. These funds will provide for the construction of 6751 miles of asphalt, concrete and brick paving, 14,320 miles of sand-clay, gravel and macadam and 8145 miles of improved earth road. The state also plan to maintain 234,582 miles of road.

The total expenditure by counties and local units for both maintenance and construction is estimated at $431,696,000, which is less than the similar estimate made one year ago by about $31,000,000. This reduction is more than offset however by the increase of more than $58,000,000 in funds estimated as available to the state highway departments. For a number of years there has been a trend toward placing control of all important state roads in the hands of the state highway departments.

The funds available as reported by the various states and the portion of the state funds derived from federal aid are as follows:

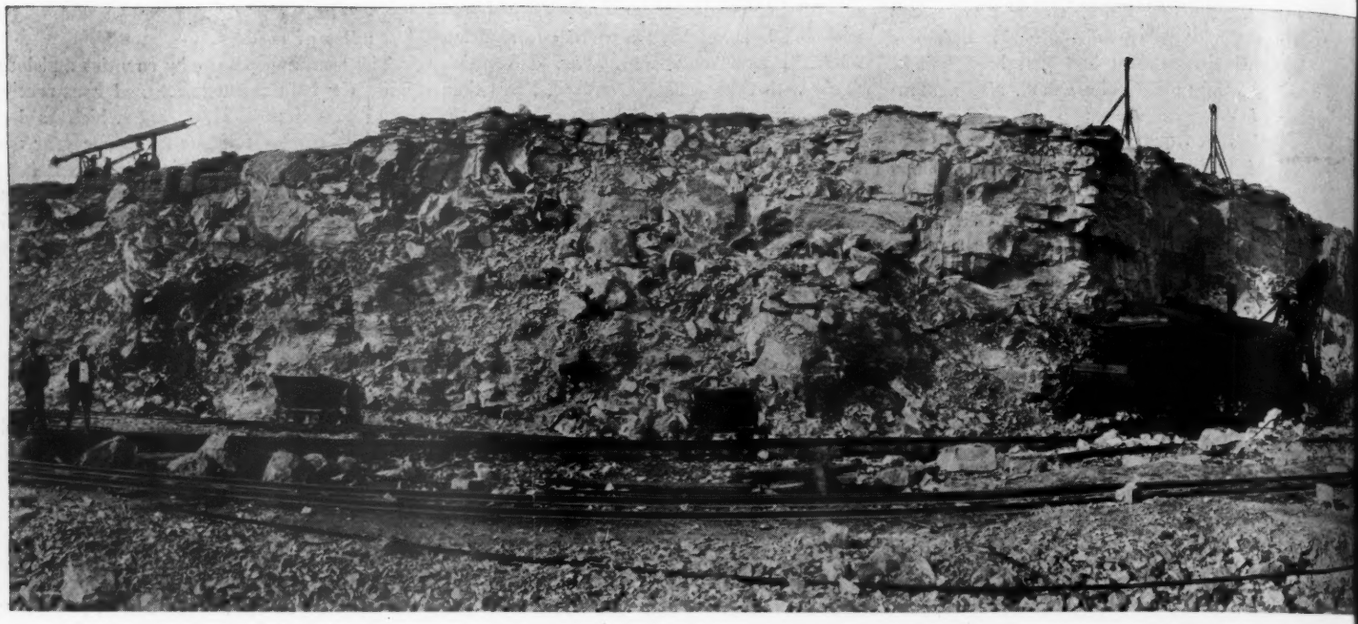
	Probable expenditure by state highway departments	Federal-aid funds available to state*	Probable expenditure by local authorities
Alabama	$ 9,900,000	$ 3,547,912	$ 12,000,000
Arizona	4,200,000	3,084,743	630,000
Arkansas	6,500,000	1,534,752	9,000,000
California	14,000,000	4,248,300	23,000,000
Colorado	4,550,000	3,285,371	5,000,000
Connecticut	7,785,289	1,611,063	2,500,000
Delaware	2,930,000	367,538	900,000
Florida	14,000,152	1,400,911	18,000,000
Georgia	7,324,750	1,931,087	13,000,000
Idaho	2,837,000	1,271,409	1,500,000
Illinois	46,200,000	6,674,249	20,000,000
Indiana	13,200,000	2,382,668	40,000,000
Iowa	13,584,108	4,028,631	16,000,000
Kansas	9,072,000	3,073,831	10,000,000
Kentucky	12,000,000	2,486,349	10,000,000
Louisiana	9,250,000	1,856,351	7,000,000
Maine	8,983,400	1,513,478	3,900,000
Maryland	7,116,398	654,831	3,200,000
Massachusetts	13,000,000	2,673,201	12,000,000
Michigan	11,500,000	4,603,379	22,000,000
Minnesota	21,500,000	2,111,863	6,500,000
Mississippi	6,250,000	1,698,458	6,000,000
Missouri	28,076,000	2,600,235	12,000,000
Montana	1,350,000	5,714,746	1,000,000
Nebraska	6,500,000	3,941,841	8,500,000
Nevada	1,670,000	1,049,593	400,000
New Hampshire	3,550,000	511,348	1,500,000
New Jersey	22,900,000	985,681	8,300,000
New Mexico	3,555,553	2,750,373	200,000
New York	35,750,000	6,938,224	26,641,000
North Carolina	16,000,000	1,715,138	10,000,000
North Dakota	5,450,000	2,506,152	3,500,000
Ohio	25,500,000	4,502,826	20,000,000
Oklahoma	10,000,000	1,894,069	12,000,000
Oregon	7,000,000	1,319,944	7,000,000
Pennsylvania	63,550,000	3,699,149	12,500,000
Rhode Island	3,790,000	675,754	875,000
South Carolina	5,540,000	892,885	2,500,000
South Dakota	3,350,000	1,282,673	5,250,000
Tennessee	18,000,000	2,374,597	9,000,000
Texas	28,000,000	4,979,641	16,000,000
Utah	3,640,798	1,502,010	500,000
Vermont	3,530,000	801,797	700,000
Virginia	10,285,500	1,481,536	2,600,000
Washington	9,000,000	1,527,002	11,000,000
West Virginia	13,750,000	912,454	6,000,000
Wisconsin	20,970,000	5,143,635	10,700,000
Wyoming	2,200,000	1,024,812	900,000
Totals	$598,590,948	$118,768,488	$431,696,000

*Included in total probable expenditure by state highway departments.

Canadian Magnesite Industry to Be Developed

A MOVE to enable Canadian producers of magnesite to compete in the world market is being undertaken by the National Research Council of Canada. Except for a short space during the war, Austria has practically supplied the United States with this highly refractory mineral, used chiefly in the manufacture of bricks for open-hearth steel furnaces and copper converters. The biggest deposit yet discovered on the North American continent of the resistant required for this purpose is in the Grenville district of Quebec.

To assist the Canadian magnesite industry, the National Research Council has recently undertaken an investigation which, it is hoped, will enable Canadian producers to meet all competition. First, it is hoped to reduce the cost of producing the Canadian magnesite, by enabling operating companies to utilize a greater proportion of the crude rock. Next, improvement will be sought so as to make the Canadian product definitely superior to anything on the market. Lastly, an attempt will be made to develop uses to which Canadian magnesite has not yet been applied. A report by the National Research Council says that the work is already well under way.



Panoramic view of quarry and crushing plant of the Blackwater Stone Co.

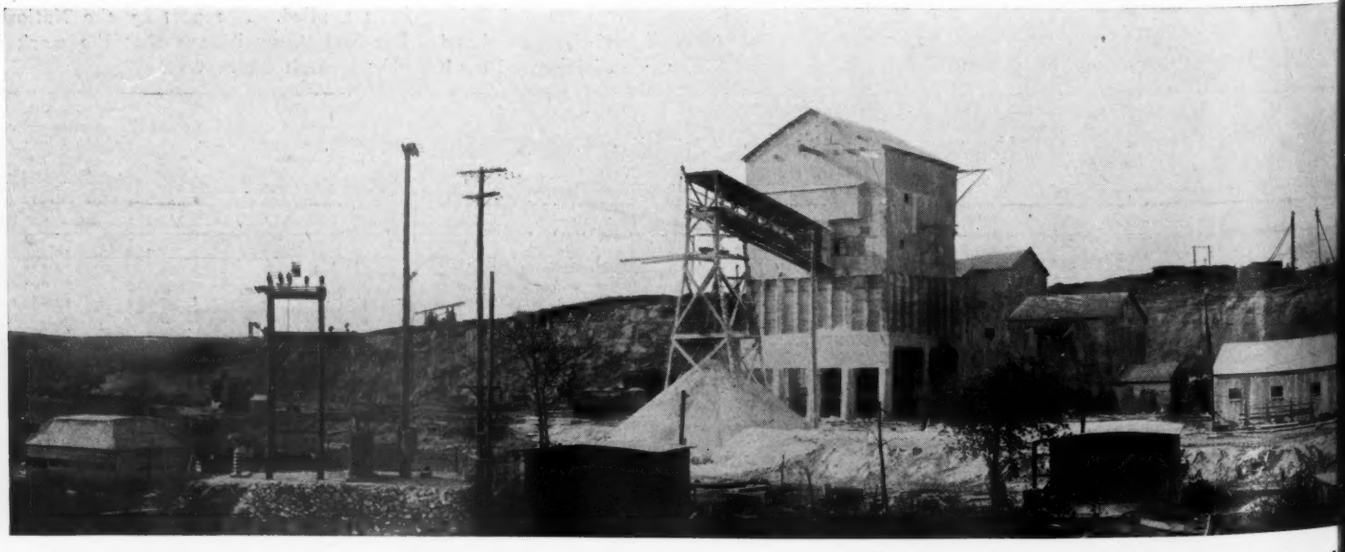
Missouri's Newest Quarry Operation

Blackwater Stone Company, by Changing Blasting Methods Increases Output by 100 Per Cent

THE quarry and plant of the Blackwater Stone Co. are on the Missouri Pacific railroad, 106 miles east of Kansas City. There is no nearby large city to furnish a market but, owing to the road program which the state of Missouri has inaugurated, there is a considerable market for highway material within the shipping range.

The ledge which is worked is the Burlington limestone of the Mississippian system and it contains a high calcium stone, running from 98 to 99% $CaCO_3$. There are no seams in it to speak of and when it is blasted by ordinary well-drill methods it breaks into large irregular shaped pieces. This necessitates considerable block holing, and to avoid this the company has developed a new system of drilling which gives greater fragmentation.

Up to the adoption of this method, a Sanderson Cyclone 4-E Senior was employed putting down 6-in. holes spaced 10 ft. apart and 15 ft. back from the face. A "junior" machine of the same make was then purchased and used to put down 4-in. holes. All drill holes are now made with a 4-in. bit 7½ ft. from the face. This permits stringing the powder out more, the length of the hole, and breaks the rock into enough smaller pieces so that the expense of putting down the larger number of holes will be more than offset by the saving in block holing. This is an interesting example of



Entire quarry face and view of crushing plant of Blackwater

...tone Co., Blackwater, Mo., located on the Missouri Pacific railroad

economy by departing from the present tendency toward larger and larger drill holes.

Dupont 30%, 40% and 50% powder is used in loading the holes. Denver rock drills are used for everything but the well-drill holes.

The broken rock is loaded into 5-yd. Western dump cars by two 70-C Bucyrus shovels. A 30-C Bucyrus revolving shovel is also used for loading and for other work. Comparatively little stripping has to be done. Three Porter locomotives draw the cars to the plant over a 36-in. gage track.

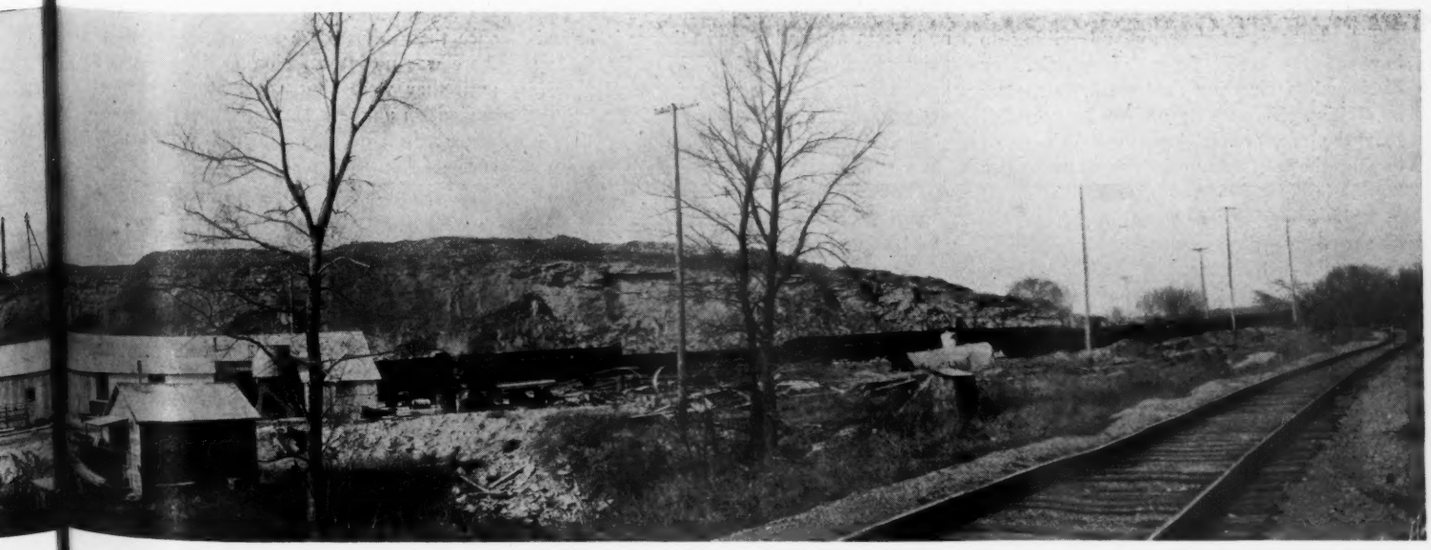
The cars run into the plant above the primary crusher and dump directly to it. This is a 36-in. McCully. The product goes to a 38-in. bucket and belt elevator which takes it to a scalping screen with 2¼-in. and 1½-in. round holes. This screen is 22 ft. long and 60 in. in diameter.

The intermediate product goes to a bin and the undersize goes to a 30-in. elevator that takes it to the two sizing screens. The oversize goes to a No. 10 McCully and a No. 5 Gates crusher and the crusher discharge goes by a belt conveyor to the same elevator to the sizing screens. These are 22 ft. long and 72 in. in diameter with a jacket. The main section has 1½-in. holes and the jacket 1-in. holes.

All the stone up to 1½-in. size goes over shaking screens to remove dust. The 1-in. and finer material is screened to take out the size between ½ and ¼-in. (which is called chats here). The "chats" and the minus ¼-in. screenings are sent to bins. The "chats" are sold for road dressing and the screenings for agricultural limestone. The demand for agricultural limestone is so strong that it is possible that equipment may be added to crush the "chats" to agricultural limestone size.

The entire plant was designed by the engineers of the Allis-Chalmers Manufacturing Co., and this company furnished all the machinery, including the motors. These include a 150-hp. motor on the primary crusher and a 75-hp. motor on the secondary crusher. A 40-hp. motor drives the No. 5 crusher. A 75-hp. motor drives the scalping screen and elevators and another of the same size the sizing screens and shaking screens. The plant structure, including the bins, is of timber, but this is placed on a reinforced concrete foundation, which includes the bottom of the bins.

Operations had been going on for about a month when the quarry was visited and owing to the heavy demand for highway material a day shift and a night shift were employed. Each shift was producing 15 cars, although 18 cars had been produced in one shift. After the change in blasting methods



...ckwater Stone Co. as seen from the railroad

described above was introduced, the capacity was increased to 35 cars a day per shift.

A good club house has been put up for the principal employes and this includes comfortable sleeping quarters and dining room. This was necessary, as the quarry is not near enough to any town for the men to find proper accommodations.

The office of the company is in the A. and R. building in Kansas City, Mo. R. Newton McDowell is president and manager. Operations at the quarry are in charge of Charles Briney, superintendent. Mr. McDowell is also president of the Consolidated Crushed Stone Corp., with other plants in Missouri.

Causes for Loss of Lime Production

Keep Kilns Full—Avoid "Slow" Firing But Do Not Neglect Human Factor

By A. S. Deringer
Oak Harbor, Ohio

IN the February 20 issue of Rock Products I told you of some of the reasons for loss of production in lime plants.

I learned long ago that an operator who was perfectly satisfied with the conditions as they exist in his plant, and looks suspiciously upon any new ideas that will benefit his product, both in quality and quantity, for fear that it will reflect on his previous record, is a very dangerous man to be in charge of any operation.

It should be the object of every man, employe and employer alike, to want to continually improve conditions that will not only lighten the burden of the employe, but tend toward being beneficial to the employer in increasing production and in lessening the cost of production.

We often find that in the ranks of employers there are some far-sighted men who, if they were encouraged and given credit for suggesting new innovations and for correcting certain faults, would be of inestimable value to their employer.

We must admit and we do appreciate to a certain extent the fact that there is much of human nature about all of us, be he the man on the lime floor or wherever it may be, as there is to the man who occupies the swivel chair.

The latter is ever ready and willing to have all the credit from his superiors or his board of directors they see fit to shower upon him. Then is it not to be expected that the employe is just as solicitous of having the credit due him bestowed upon him as is his superior. But when that credit is withheld and someone not deserving of it is patted on the back and made much of because an inferior in the ranks suggested it, is it any wonder that a lot of improvements and a cure for a lot of trouble and annoyance that could be overcome never comes to the light of day?

We are getting away from the point of our argument, but before we proceed with the main thoughts of this article I would like to impress upon the readers not to overlook the employe, for there may be in your ranks a man or several men who would, if given the proper encouragement, be the means of revolutionizing your business, or they may, at least, have a remedy for the particular trouble that has handicapped a certain phase of your operation.

All of us know that Nature has given us two eyes to see with and two ears to hear with. But we all realize that no two of us see alike nor hear alike and that your operation may have just the man to see or to hear a certain defect in the operation that is not detected by anyone else.

Kilns Should Be Kept Full

One of the common faults in a lime plant today is that the kilns are not kept full to the top. A good many operators will tell you: "Oh, it isn't necessary to keep the kilns filled to the top all the time; just so there is enough stone in them to make lime." They do not stop to think of how much lime or what kind of lime they make when such conditions are permitted to exist.

Let that operator spend some time at a plant where the kilns are kept filled all the time and then let those same kilns be drawn down to a point where the fire and the red-hot stone are visible from the top and let those conditions prevail for a day or two and then see the difference in both quantity and quality of production. Why do kiln designers who have made a study of lime kilns both from a practical and a theoretical standpoint recommend and build kilns that have a large storage and preheating zone if it were not intended to benefit the burning of lime?

We all know that the burning of lime is not a spasmodic operation, that they are not run today and are idle tomorrow, but that it is a continuous operation day after day which of necessity will find inclemencies of the weather that are not conducive to procuring the best possible product to be converted into lime. It is evident that unless your kilns are kept filled to the top the wet stone or stone covered with ice and snow and dumped directly into the tempering zone or into the burning zone of your kilns, will greatly reduce their efficiency, and that the excess heat which passes off is so much waste that should be utilized to perform the work the heat is called upon to do.

The principle of the storage and preheating zone, and the purpose for which it was intended and from which it derives its name, is to store the stone preparatory to burning, and to utilize all or the greater portion of the waste heat that passes from the calcining zone through the tempering zone to prepare the stone for each following step, and thus expedite the calcining process.

We can readily see that as the stone gradually moves down the shaft of a kiln, and if it is gradually brought into contact with the heat, whereby the greater part of the moisture has been driven off and the stone made more susceptible to the calcining process, the greater will be the output and the better the quality of the lime. This is not true if the kilns are not kept filled and the above mentioned process not permitted to take place.

Another serious handicap to the quantity and quality production of lime is the occasional practice of what is commonly known as slow-firing the kilns. This practice has become more prevalent in the last 10 or 15 years. I dare say that before that time this practice was seldom if ever resorted to. The first experience that I ever had with lime kilns this practice was entirely absent.

The plant I have in mind only operated about eight or nine months in the year as the shipping had to be done by boat, but once these kilns were started in the spring there was no intermission in their operation until they were shut down at the close of navigation unless it became necessary to shut down a part or all of them for the lack of business.

But if businses conditions permitted they were operated continually and the lime kiln force had neither a Sunday nor a holiday for the entire eight or nine months.

The stone for these kilns was broken and loaded by hand and was also put into the kilns by hand. It mattered not the condition of the weather; there had to be and there always was a sufficient supply of stone loaded on cars to enable them to keep the kilns filled to the very top.

I do not know of a lime plant that was built some forty-odd years ago that produced the tonnage that this plant did for its size. I attribute this tonnage to the fact that the kilns were always charged with a

uniform size stone. The process of firing was always religiously scrutinized, the kilns were always kept filled to the top, and the practice of slow firing was never resorted to.

Slow Firing Harmful

You will ask what effect does slow firing have upon the kilns, and how did the men stand it to work continually seven days in the week for eight or nine months. To take them in their order, the practice of slow firing lime kilns is harmful in more ways than one. The first of these is that not enough care is given to the way in which the process of slow firing is first begun. The firemen receive orders that after the last draw of the day is made they are to slow fire for a 24-hour period. Immediately after the draw is made they cease firing only as is necessary to keep the fires burning. This allows the kiln that has been under an almost certain temperature for a week to cool off too rapidly and serious harm results to the interior of the kiln. Then, too, in the process of starting up the kiln again not enough care is exercised to bring the kiln up to a certain temperature gradually to permit of equal expansion.

Let some operator experiment with two kilns that are in perfect condition, and let him fire the one continually and slow fire the other occasionally and at the end of a year compute the average daily output for the days in operation; also let him see which kiln will have the longest life. If I had no knowledge of or experience with lime kilns I would venture a guess that the continually fired kiln will show the best average and have the longest life, and I don't think I would be far wrong in my guess. Slow firing always tends to impair the output in that it either produces a lot of overburned or underburned lime, depending upon the attention given to the slow-firing period.

Also in the case of the kilns being cooled off to a certain degree it naturally requires some time to get them back to their normal temperature. Unless caution is observed and good common sense used, the process of slow firing has a tendency to make the kilns hang, which often necessitates skipping three or four draws, and cooling the kiln down again before they will drop. I want to caution everyone who has experienced this trouble never to resort to the use of water. While some do it and others recommend it, it is a very serious practice, not only injurious to your kiln and lime but dangerous as well to the employe. There are a number of common sense methods to prevent extreme cases of hanging up. Every lime burner realizes that in order to get a good product and a good output it is necessary for all kilns to hang slightly—which is only natural.

Human Element Must Be Considered

The part that the human element plays in the operation of a lime plant, I dare say, is the chief reason or cause for slow firing. It is done to give the men a day of rest and an occasional holiday. It sometimes becomes necessary to slow fire, especially when there is a stretch of bad weather and the stone supply becomes depleted and conditions make it impossible to replenish the supply.

But the main reason is to give the men their Sundays and holidays, which is fit and proper; in fact, they are entitled to that by all moral rights. But look at this last phase of the operation in whatever light we please, the fact still confronts us that the cessation in kiln operation due to recognizing the employes' rights seriously impairs the ouptut.

Personally, I would accept it as a condition that cannot be remedied unless I were fortunate in having men, a part of whom had their Sabbath on Saturday, and the others on Sunday.

Hydrate or Quick-Lime for Railway Boiler-Water-Treatment Plants*

Railway Officials' Answers to the Question: What Are the Relative Merits of Slaked and Unslaked Lime for Water Treatment?

The Advantages of Slaked Lime

By R. C. BARDWELL
Superintendent Water Supply, Chesapeake & Ohio, Richmond, Va.

THE ONLY possible advantage of unslaked lime over hydrated lime when used for water treatment on railways, is the smaller cost for the higher active chemical content in the initial material. However, the many disadvantages of unslaked lime have warranted its replacement with hydrated lime at a large majority of water treating plants in railway service. The following is an enumeration of the advantages of hydrated lime:

1. Convenience in handling and transferring.—Unslaked lime rapidly deteriorates when exposed to moisture or carbon dioxide in the air. It is usually furnished in bulk or in large wooden barrels while hydrated lime is supplied in 50-lb. sacks which can be conveniently handled and stored.

2. Where hydrated lime is used, the expense and space requirements of slaking equipment are avoided.

3. Where unslaked lime is used, it is advisable to install air proof storage facilities. With hydrated lime, this expense is avoided.

4. The hydrated lime has a more uniform strength and is therefore more reliable in its chemical application.

5. Even with poor storage facilities, the hydrated lime retains its strength much better than unslaked lime in the air proof vaults.

6. With hydrated lime there are smaller amounts of grit and impurities and better results are obtained from chemical pumps and check valves.

7. With hydrated lime the nuisance from steam generated by slaking is avoided.

Unslaked Lime Is Cheaper

By O. T. REES
Chief Chemist, Atchison, Topeka & Santa Fe, Topeka, Kan.

In treating with lime and soda ash there are two forms of lime to be taken into consideration — quick-lime and hydrated lime. Before there can be any reaction the lime must be in the hydrated state. Our plants are designed to take the lime as it comes from the kiln—as quick-lime—store it in bins well protected against the free access of air, and slake it as it is needed, utilizing the heat generated in the slaking process for dissolving the soda ash. Many of the plants now being designed use the hydrated lime which is now a stable commercial product. It has been slaked at the kiln with sufficient water added, to render the product turned out a fine, light powdery form that will readily mix with more water, but without any generation of heat. This material is handled in paper bags and will keep almost indefinitely without deterioration.

The lime in this state is very desirable at plants where small amounts of it are used and where weather conditions are such that the ordinary quick-lime air-slakes rapidly. If quick-lime is used under these conditions its strength is quite an uncertain factor and satisfactory treatment is a difficult problem for the average water treater.

It would seem advisable also to say something of the relative cost of the two forms of lime. In buying quick-lime there are almost certain to be unburned cores, dirt, chirt, sand, etc., present, and under the best of conditions there will be some air-slaking and waste in handling. Our experience has taught us that we can normally expect 10% of the lime to have no reacting value.

On the other hand, hydrated lime is practically pure. It is a uniform product, providing that hydration has progressed uniformly. For comparison we will assume that the hydrated product is fully hydrated and free from impurities, in which case 74 lb. of the material is required to give the same reaction as 56 lb. of the chemically pure quick-lime, or 62 lb. of lime 90% pure Then, for each 100 lb. of ordinary quick-lime costing around 56 cents we would have to use 119.3 lb. of hydrated lime at 81 cents per 100 lb. or 97 cents worth, which is 173% of the cost of quick-lime.

The tonnage of the chemical transportation would be increased by the use of hydrated lime from 20% to 25%, with an increase in cost and apparently no better treatment. As a general proposition, therefore, we do not feel justified in changing over to the use of hydrated lime exclusively. But, as stated before, at some of the smaller plants we have found the change profitable in results if not in cost.

*From *Railway Engineering and Maintenance*, February, 1926.

Some Principles of Quarry Operation and Crushed Stone Production

I—Know Your Material and Plan Your Operation for Economical Production

By Loyd Wilson
Consulting Engineer, Detroit, Mich.

THE PURPOSE of a crushed-stone quarry operation may be to furnish a raw material for some other industry such as a cement plant, blast furnace, chemical plant, etc., or it may be to supply stone for construction purposes.

A stone that is chemically suitable as a raw material for one kind of manufacturing may be totally unsuitable for another. For example, the presence of more than a certain percentage of magnesia would not necessarily prevent its use as a blast furnace flux, but would render it unsuitable for the manufacture of cement. It would also prevent the use of the blast-furnace slag in the manufacture of cement, and we all know that the utilization of waste products is every day becoming more common, as disposal areas are becoming exhausted and the increasing real estate values in our larger cities are preventing the acquisition of additional areas.

In other industries the presence of a large amount of silica, iron, or aluminum is undesirable. The higher a stone runs in calcium carbonate, the greater are the number of uses as a raw material for which it is suitable, although there are a few industries in which a dolomite is considered preferable.

Although the original purpose in opening the quarry may have permitted the presence of several of the above mentioned impurities, without disadvantage, there is always the possibility that we may wish to find other outlets for a portion of our quarry output and, the fewer the impurities, the greater will be its market possibilities for chemical purposes. Yet we all know that a deposit of the purest stone is absolutely worthless unless it is so located that it can be quarried and transported economically to the place of consumption.

If our purpose is to supply stone for construction purposes the chemical quality is, of course, of little account, and we need only concern ourselves with its hardness, cleanliness, market cost of quarrying and transporting.

Importance of Location

If we do not know that we have the best possible location, how are we to know that a better location will not later be developed that will permit the production of a product superior to ours at the same or less cost, or a product equal to ours at less cost? This might not cause the abandonment of our operations, but it must mean that we will not enjoy the profits that we would have enjoyed if we had secured the best location to start with.

Loyd Wilson, the author of this—the first of a series of articles on quarry operation—has had many years' experience with the limestone quarrying departments of the Solvay Process Co. and the Michigan Limestone and Chemical Co. He is also familiar with sand and gravel plant operations

Locating Quarries

It is true that more thought is now being given to the proper location for quarries than was the case in the past, but still more could be given to advantage. One of the officials of a company using a large amount of limestone, recently told the writer that, limestone is such a cheap commodity its users cannot afford to spend much money on investigations regarding it. It is true that limestone is probably one of the cheapest of all commodities, but that is no reason why we should waste money in preparing and shipping it to a market, if it is possible to prevent such waste.

In locating a limestone deposit for the purpose of supplying a stone of a certain analysis we should in the first place start early enough so that we will be able to investigate the matter thoroughly and not find ourselves obliged to take the first deposit that appears at all suitable. We should start out with a known point of consumption and obtain from state geological surveys general information as to where the kind of stone that we wish to locate is liable to be found. We may also be able to obtain additional information regarding deposits from other sources. We should put all of this information down on a map showing the various railroad lines radiating from our point of consumption. This will show us in general the practical locations to be examined.

If our point of consumption is located where water transportation is possible, our survey must be extended for a much greater distance. In fact stone is now being transported on the Great Lakes for a distance of 500 miles at a cheaper rate than 20 miles by rail. However, we know that in the case of water transportation, the deposit must lie within reasonable distance of the shore line, which will limit the amount of property to be examined even though it may lie a long distance from our point of consumption. By noting all likely locations on the map we will guard against the possibility of passing by properties that might in the end prove to be the most economical.

By the process of elimination the number of possible locations can quickly be reduced as inquiries regarding freight rates and other governing features will soon show many of them to be utterly out of the question. The few that remain should then be considered more carefully. The quality and extent of the deposit, the investment required for development and the probable operating and shipping costs should all be estimated for each case separately so that the cost of the stone at the point of consumption from each may be determined.

In the consideration of deposits for water transportation considerable thought should be given to harbor possibilities, soundings should be taken and the bottom should be

tested to determine whether or not rock dredging will be necessary. The contour of the shore line should also be noted in order to determine whether or not one location has advantages over another in the way of natural points that would reduce the cost of breakwaters necessary for protection.

The overhead cost on the investment necessary to provide docks, unloading facilities, equipment for recovery and transfer to the mill where the stone is consumed, storage to care for requirements during the season closed to navigation, also all operating costs in connection with same should not be neglected when shipment by water is being considered.

The development of stone deposits for construction purposes frequently takes place on account of local demands that are apparent. However, it would always be worth while, when considering an investment along this line, to examine the surrounding country in a manner as suggested above, in order to determine definitely that there are no better locations that may later be developed.

Purpose of This Article

Some who read this article may say that of course they would not think of going into an expensive quarry development without first looking the matter up carefully, possibly not in quite the detailed manner suggested by the writer, but sufficiently to make sure that they were on the right path. Some of them may do so, but the writer could name instances of large quarry developments that have been made for the purpose of supplying stone for chemical manufacturing purposes without a single core hole having been put down to determine the quality of the stone. He could also name a plant that was built for water transportation where the harbor conditions were such that vessel owners refused to send their boats there to load. He knows of another instance where only a systematic search such as described, prevented the passing by of a valuable limestone deposit.

Companies purchasing reserve stone deposits may be inclined to consider that, because these deposits are probably not going to be developed for a number of years, they need not investigate the matter as carefully as they would if they were purchasing them for immediate use. However, the only reason for such investment is to have the deposits when they are needed so it would be well to make sure in the first place that what they are buying is going to be suitable for their purposes and practical and economical to develop.

The writer has listed in this article the various points that he believes to be worthy of consideration in the selection of sites for quarry developments and has attempted to show the importance of some of them.

This article is, therefore, intended merely as a reminder to manufacturers using stone for one of their raw materials who, on account of what may appear to be more pressing matters, may be inclined not to give much attention to their stone supplies as the question might deserve. It is also intended as a reminder to those who are in the commercial stone business, and may be considering further expansion, to investigate more carefully the location for their operations in order to determine definitely that they will be able to meet not only the present competition, but also that which may develop in the future.

(To be Continued)

The next article will discuss the possibilities of improving operations at existing plants.

Lessons from the Cement Industry*

Strikingly Told by G. S. Brown, President Alpha Portland Cement Company, Who Has Recently Become a Director of the Vendor Slate Company and Allied Quarrying Interests to Slate Quarrymen

AFTER a brief picture of the organization and work of the Portland Cement Association, its trials and methods of raising funds, Mr. Brown, as the guest speaker of the National Slate Association luncheon to quarry managers at New York City, January 18, aroused the groups to their responsibility. He added his words to President Male's urging quarry managers to give more support and teamwork to the National Slate Association. He said in part:

Since I have become connected with a slate company, I have wanted to know why the slate industry, which has, in my judgment, a great many more natural advantages than cement, should have allowed its market to be taken away from it by competitive or substitute materials.

I have talked to people in the slate industry on the need of co-operation as illustrated by the portland cement industry. I cannot help feeling that today the old-fashioned methods of driving everybody into the ground by reducing prices and cutting down in order to overcome lack of money will not get you anywhere. The principle is all wrong. The solution is co-operative effort. You must pull together, whether or not you like each other. You don't have to kiss each other, but you must work together. No large industry today gets along without such co-operation.

From an Annual Budget of $100,000 to $3,000,000

Of course, we didn't do it all in a day. From about $100,000 budget in 1902 we have come to about $3,000,000 in 1925. And the members pay it willingly. I would sign a check for the Portland Cement Association with greater good-will than any other check, and that is true of all in the association. We do not have any trouble in collecting our money. In 1925 everybody was poor, had to borrow from banks to meet payrolls. It seemed that some would balk at paying a large sum of money to an association engaged in more or less general efforts which somebody thought were going to do some good, but nobody knew just how.

No company belongs to the Portland Cement Association unless they sign a pledge not to ship any products that do not meet standards of the A. S. T. M. and the U. S. Bureau of Standards. This is insisted upon. We chaperon the use of portland cement. We work out in our laboratories the best methods for the use of portland cement. We want to put our product in the hands of the public for the least money possible with best return for employes and capital invested.

I am thoroughly convinced in my own mind that the slate industry can do the same thing. If I had enough money to take over all of the slate quarries, I would borrow from the bank enough money at once to start promotional effort for the use of roofing slate and other types of slate and regain the market that has been lost. Cement has taken part of your market. We will take more of it if you don't try to hold it. We are making cement tile for roofs. We are advertising it. You are doing nothing in the way of advertising to make us stop. Our fight is not with slate. It is with asphalt and other products. We do not know that there is slate so far as our promotional effort of roofing material is concerned. You cannot possibly expect people to run to you to get slate when there are numbers of men running to them to show them what a good roof they have to offer. Your competitors are constantly before the public and running after it. You must go out for your fair share of the business.

Honesty the Foundaton of Promotional Effort

I am anxious to see this industry get together, and get out to make business on the basis of absolute honesty. Represent to the purchaser just what you are going to give him, and give him just that. Co-operate to go to the communities that do not use slate now. Show them it is the best roof in the world. As a cement man I am telling you what you should have told me long since, that slate is the best roofing material in the world, yet I am a competitor.

Give the man who runs your association enough money to start this work right, and I am convinced that within two years those lines on the chart showing the quantity of roofing slate produced which have been going down will begin to go up most decidedly.

I am a citizen of Northampton county, and the slate industry is one of the great industries of that county. The prosperity of that county depends to considerable degree on the prosperity of the slate industry, and for this reason I would like to see the thing done.

* * *

I want to emphasize also quality. The most important thing in an industry. If you attempt to go into co-operative work to sell your product through promotional work, you must give people exactly what you tell them you are going to give them. It won't take long for the people to know you are living up to your word.

*From the *Slate News Bulletin*, of the National Slate Association, March, 1926.

Deep River Dredging for Sand and Gravel

Portland Gravel Co.'s Newest Dredge Equipped with 2½-Yard Bucket Digs 120 Feet Below Water Level

THE Portland Gravel Co. is one of a group of allied corporations headed by H. F. Puariea, of Portland, Ore. The others are the Willamette Gravel Co., the Columbia Sand Co. and the Willamette Tug and Barge Co. Together these produce and transport about half of all the sand and gravel which is used in Portland. These companies are wholly producing companies, selling all their production to companies which deliver to consumers.

The Portland Gravel Co.'s new dredge began production about August 1. It is a clamshell dredge with a 2½-yd. bucket, and this type of dredge was chosen because it meets local conditions better than any other. The Willamette river is very deep at Portland, 40 ft. being the usual low water depth in the channel. In some places the dredge has to dig 120 ft. below the water. A pump suction for this depth would be too unwieldy to handle. Furthermore the production is almost all gravel, the sand accompanying it being small in amount and not well enough graded to be a good concrete sand. What sand is dug is thrown back into the river.

Bow of the new dredge of the Portland Gravel Co. showing the bucket coming up beside the hopper. Note gravel loading belt at left

The dredge was built from the experience obtained with the dredge of the Willamette Gravel Co., which is also a clamshell bucket dredge. Several changes were made in the design and construction and the result may fairly be called "the last word" in dredges of this type.

The problem in building a bucket dredge is to find a way to bring the bucket over the receiving hopper after it has dug its load and been raised above the deck. On the Willamette dredge the bucket is hauled up an incline on the bow of the dredge, thus raising it and bringing it inboard along the center line. On the Portland dredge the bucket is brought up alongside of the hopper which projects beyond the bow. This if digging in shallow water would throw some side strain on the hull during the digging. But at the depth at which the Portland dredge digs the bucket is so nearly under the center line of the dredge that the side strain is negligible. The weight of the bucket after being raised is counterbalanced by the hopper except for the moment that the bucket is swung over the hopper for dumping.

The power plant of this dredge is a 200-hp. Fairbanks-Morse full-Diesel engine with a 7½-hp. auxiliary for pumping hull and barges dry, for running the lighting plant and, especially, for running the compressor that furnishes the air that starts the big engine. On the shaft of the 200-hp. engine are two belt drives, one leading forward and one aft. The forward drive runs the hoist that handles the bucket, the aft drive runs the washing plant, crusher and conveying system. Both drives are through clutches and the clutches are handled through levers in the control cabin.

The hull is 130 ft. long and 35 ft. wide very solidly built and braced with fir timbers. All the main timbers in the hull are without splices, being cut to full length at the mill. Two 12x18-in. timbers are bolted to the main timbers through the deck and project about 12 ft. over the bow and these carry the receiving hopper.

This is about 10 ft. square and is covered with a grizzly of rails set with about 8-in. spaces. Rails have not been found so satisfactory for this grizzly as timbers so timbers are to be substituted later. The timbers wear slowly but the rails bend and get out of place.

The bucket holds 2½ yd. and was made by the Stockton Iron Works. It is of a type designed for heavy digging service. The ropes from the bucket pass through a sheave on a boom about 75 ft. long and back to the drums of the main hoist, which is along the center line of the dredge. The boom is supported by ropes which pass to sheaves on an A-frame in front of the deck house and a square frame behind this holds the sheaves for the lines which swing the boom. These lines pass to a smaller hoist.

The main hoist has two large drums each of which has a driving gear. These gears are meshed to the same pinion. The drums are fitted with 60-in. V-type Thermoid brakes and the drive is through a heavy 6-arm clutch. All this hoisting machinery was made by the Hesse-Ersted Iron Works of Portland and was designed for the work and to occupy the space it does by Ray Purdy, the engineer of the Hesse-Ersted company.

The gravel is fed from the bottom of the hopper to a 30-in. conveying belt, 72-ft. centers provided with a gravity take-up. This and the other conveying machinery was furnished by the Stephens-Adamson Co. The belt passes through the deck house and discharges into the washing screen.

This screen is of a type designed by Mr. Puariea after considerable experimenting. The ends were obtained from the Allis-Chalmers Manufacturing Co. and provide a tire and trunnion drive for both ends. It is 16 ft. long and has sections of 48-in., 72-in., and 96-in. diameters. The gravel screen sections are of punched plate with 1⅝-in. and 1-in. square openings but with the squares set on the diagonal. Mr. Puariea found that this type of screen was about 15% more efficient than one with the openings set in line with the screen axis. The sand jacket on the outside is of ⅜-in. mesh woven wire cloth.

As the hopper is made with slotted sides

New dredge of the Portland Gravel Co., designed for deep river work

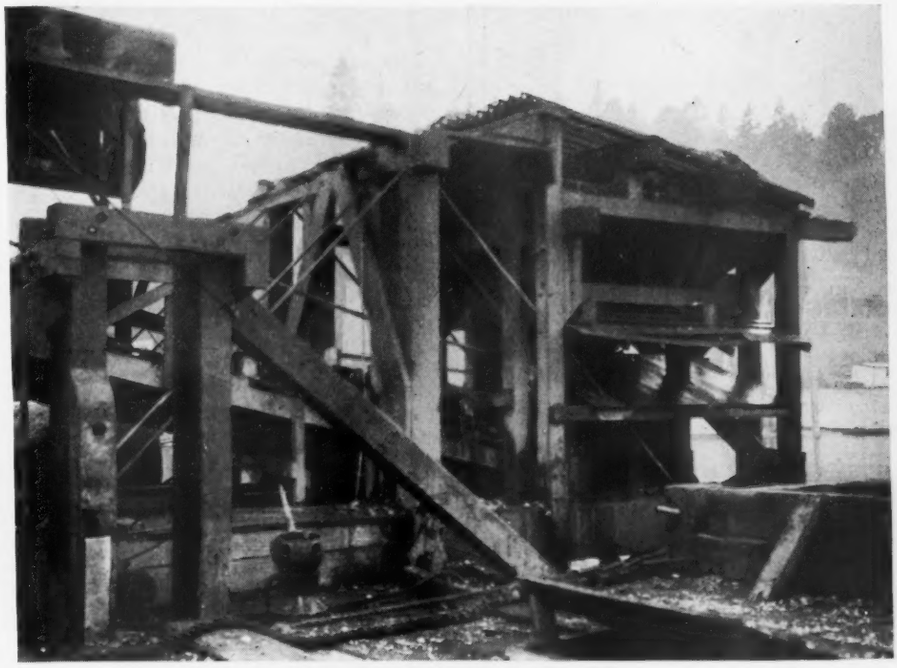
Looking down at the screen from the top of the deck house

the gravel is pretty well dewatered before it goes on the conveyor. Water is added at the screen to aid in screening and to wash off the fines.

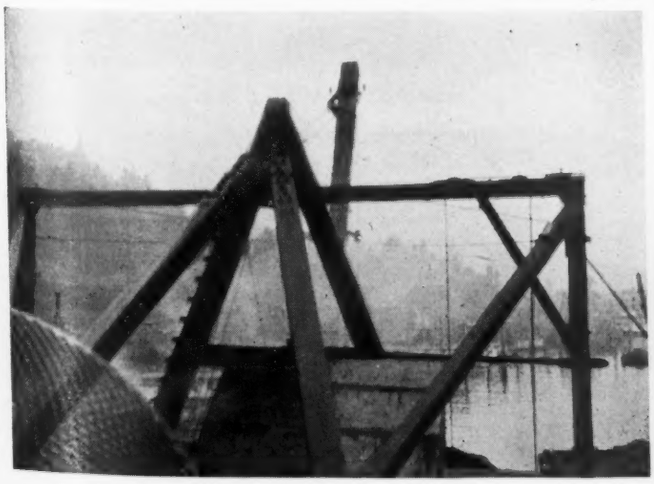
The oversize of the screen goes to a 48-in. Symons disc crusher and the discharge of the crusher is sent out with the gravel. The sand is discharged to the river.

The gravel goes to a horizontal conveyor that brings it to the forward part of the hull and then discharges it to a short conveyor that projects from the side of the deck house and delivers it to the barge at the side. The reason for bringing the gravel back on the horizontal conveyor is that it makes it more convenient for loading a barge by the side of the dredge. In fact it would be dangerous at some stages of the water to load with a barge in any other position.

Sand to go with this gravel is obtained from the Columbia river about 14 miles from Portland. The company there operates as the Columbia Sand Co. and has a suction dredge fitted with a Byson-Jackson centrifugal pump which has a 10-in. suction and a 12-in. discharge. This is driven by a Fairbanks-Morse full Diesel engine. It pumps directly on barges.

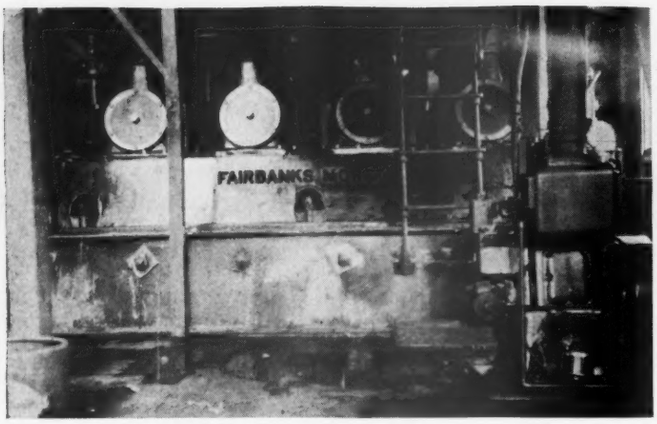


The hopper on the bow of the dredge. It has slotted sides to permit water and sand to run out

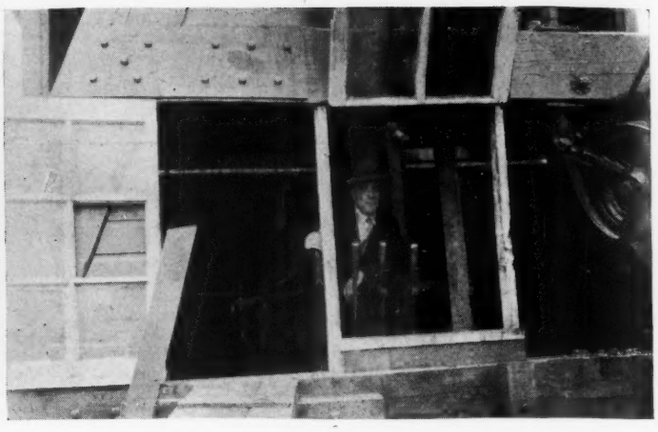


Side view of boom, A-type frame and hopper

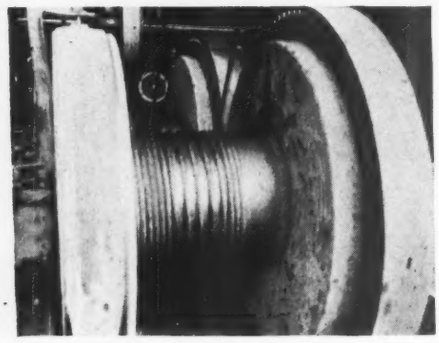
The A-frame that supports the boom and the square frame and sheaves for cables



Power plant of the dredge. The 200-hp. full-Diesel engine



Control cabin and H. F. Puariea at the controls



The drives of the main hoist

Portland has an ordinance providing that only sand from the Columbia river shall be used on public work and this has naturally set a standard for all of the sand used in the city.

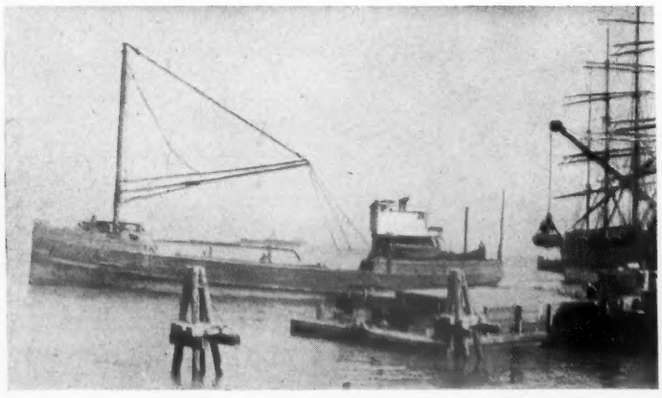
The company has its own fleet of barges and tugs with which it delivers to the dealers who handle its product or to other points on the river front as they direct. A considerable part of this year's production has gone into the piers and approaches of the three new bridges which are being constructed to accommodate the heavy traffic between the east and west sides of the city.

The office of the company is at 289 East Salmon street, Portland. H. F. Puariea is president, Philip Hart is vice-president and H. P. Warren is secretary-treasurer of the company.

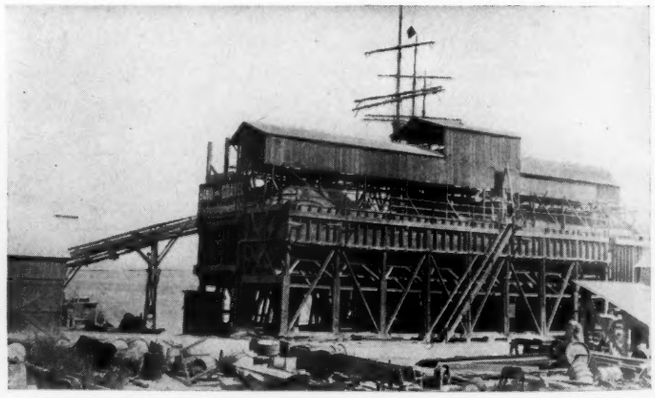
Channel Deepening and Gravel Production Combined

SAN FRANCISCO, Calif., has an organization that is able to combine a channel-deepening job with sand and gravel production. This is the Bay Development Co., which has a sand and gravel screening plant near Pier 54 on the waterfront.

The sand and gravel is delivered by means of barges and suction dredger. The material is picked up from this dredge and barges by means of a clamshell bucket and deposited in an elevated receiving hopper, delivering to a belt conveyor which in turn delivers the material to the screens and the distributing conveyors along the top of the storage bins.

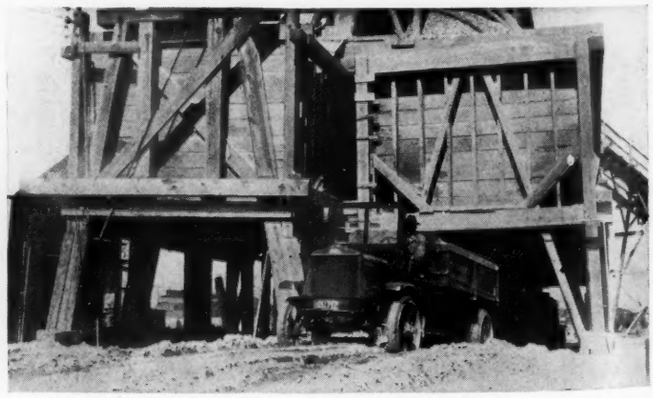


Dredge of the Bay Development Co., San Francisco



Sand and gravel plant of Bay Development Co.

Unloading sand and gravel at waterfront



Truck-loading bins of the Bay Development Co.

Revised Specifications for Gravel Ballast

Committee Report of the American Railway Engineering Association Tentatively Adopted

FOLLOWING is the report of the sub-committee of the ballast committee of the American Railway Engineering Association, tentatively adopted by the association at its 27th annual convention at Chicago, March 9:

The existing specifications for washed gravel ballast were adopted at a time when the use of such material was comparatively new. It was recognized by the committee on ballast that it was an imperfect specification and with a view to learning the feeling in regard thereto, the sub-committee sent out the following questionnaire to the railroads:

1. Should the amount of sand which is permitted by the specifications be changed?
2. What per cent of gravel should there be between ½ in. and the No. 10 screen?
3. Is it desirable to lower the maximum size from 2½ in. to 2 in.?
4. Should the per cent of large aggregate between the maximum size and 1 in. be limited to some particular per cent of the total volume?

Replies were received from 33 railroads using gravel ballast and these indicated a change desired.

It is recognized by the committee that gravel may be well washed, well screened and well graded and yet be practically worthless as ballast because of its lack of resistance to disintegration and wear. Some work has been done looking towards the development of a test for "soundness." As yet nothing has been developed that can be put into practice, but it is hoped that in our next report such a test will be in shape to present for your consideration.

In view of the information developed by the questionnaire referred to above and from other sources, the committee proposes the following:

Present Specifications	*Revised Specifications*
Gravel for ballast shall be so prepared that dust, loam and dirt are removed, that all aggregates that will not in any position pass through a 2½-in. ring are rejected; and that the sand contained in the ballast shall not, in volume, exceed 20% nor be less than 15% of the material as loaded for use.	Gravel for ballast shall be so prepared that all dust, dirt and loam are removed, that all aggregates that will not in every position pass through a 1½-in. ring are either rejected or crushed and returned to the ballast and that the resultant product conform to the following:
The term "sand" where used in these specifications, refers to any hard granular comminuted rock which will pass through a No. 10 screen and be retained on a No. 50 screen.	Where the percentages of crushed material runs between nothing and 20, the ratios of various sizes of aggregates to the whole shall be as follows: 1/10 to ¼ in...min. 25% max. 40% ¼ to ½ in.....min. 20% max. 30% ½ to 1 in.....min. 20% max. 55% 1 to 1½ in.....min. 0% max. 35% Where the percentage of crushed material runs more than 20 and less than 40, the ratios of various sizes of aggregates to the whole shall be as follows: 1/10 to ¼ in...min. 10% max. 30% ¼ to ½ in.....min. 20% max. 35% ½ to 1 in.....min. 20% max. 60% 1 to 1½ in.....min. 0% max. 50% Where the percentage of crushed material is more than 40, the ratios of the various sizes of the aggregates to the whole shall be as follows: ¼ to ½ in.....min. 20% max. 35% ½ to 1 in.....min. 25% max. 60% 1 to 1½ in.....min. 5% max. 55%
Test No. 1. Dust, Dirt or Loam	
A sample of the prepared ballast containing ⅛ cu. ft. shall be placed in a watertight receptacle having a capacity of not less than 1 cu. ft. Into this receptacle shall then be placed two quarts of clear water, after which the receptacle shall be agitated until the gravel is thoroughly washed. The water shall be drained off immediately and placed in a glass jar and allowed to settle. If the sediment deposited in the bottom of the jar is more than one-half of 1% of the volume of sample, the output of the plant shall be rejected until the fault has been corrected.	A sample of the prepared ballast containing ⅛ cu. ft. shall be placed in a watertight receptacle having a capacity of not less than 1 cu. ft. Into this receptacle shall then be placed two quarts of clear water, after which the receptacle shall be drained off immediately and placed in a glass jar and allowed to settle. If the sediment deposited in the bottom of the jar is more than one-half of 1% of the sample, as determined by weight, the output of the plant shall be rejected until the fault has been corrected.
Test No. 2. Large Aggregate	
A sample weighing not less than 150 lb. shall be placed in or on a screen having round holes 2¾ in. in diameter. If a thorough agitation of the screen fails to pass through the screen 98% of the material, as determined by weight, the output of the plant shall be rejected until the fault has been corrected.	A sample weighing not less than 150 lb. shall be placed in or on a screen having round holes 1½ in. in diameter. If a thorough agitation of the screen fails to pass through the screen 98% of the material, as determined by weight, the output of the plant shall be rejected until the fault has been corrected.
Test No. 3. Sand	
One cubic foot of the prepared ballast shall be thoroughly dried, placed in a screen having ten meshes to the	One cubic foot of the prepared ballast shall be thoroughly dried, weighed and placed in a screen having ten
Present Specifications	*Revised Specifications*
inch and the screen agitated till all particles which will pass have passed through the screen. If the material which passes through the screen exceed 20% or is less than 15% in volume of the original sample, the output shall be rejected until the fault has been corrected.	meshes to the inch and the screen agitated till all particles which will pass have passed through the screen. If the material which passes through the screen exceeds 3% of the original sample, as determined by weight, the output shall be rejected until the fault has been corrected.
Inspection In case inspection develops the fact that the material which has been or is being loaded is not in accordance with these specifications, the inspector shall notify the manufacturer to stop further loading until the fault has been corrected, and to dispose of all defective material that had been loaded in cars, which shall be done at the expense of the contractor.	No change.
Measurements When ballast is being paid for by the ton, and it is impracticable to weigh each car, the weight per yard shall be obtained by weighing at frequent intervals not less than five cars loaded with ballast, the contents of which have been carefully measured. The weight per yard obtained by such a test shall be used in figuring the weight per car until another test is made.	No change.
When ballast is paid for by the yard, the amount shall be determined by weighing each car, where practicable, and applying the weight per yard as determined by frequent tests. When impracticable to weigh each car, the contents of each car will be carefully estimated by comparison with cars, the contents of which have been actually measured.	No change.

Conclusions

It is recommended that the specifications for washed gravel ballast now appearing in the manual be withdrawn and that the revised form prescribed herewith be accepted as a tentative specification with a view to its adoption as recommended practice one year hence.

Takes More Than Corn to Make a Porker

Iowa Experiments Show Results of Adding Limestone Mixtures to Hog Rations

By Cary A. Rowland

EVERYONE knows that the Corn Belt is also the Hog Belt. Under the American system of feeding, corn is indispensable to the profitable feeding of hogs for market. But it takes a lot more than corn to fit a bunch of hogs to make market toppers at a cost which shows a profit to the feeder.

When it comes to feeding hogs scientifically, it is a pretty safe bet that "Johnny"

Courtesy Iowa State College

Minerals plus iodide made him grow. This porker made a splendid gain at a low cost per pound on the usual vegetable ration containing simple minerals and in addition about 1 lb. potassium iodide to every 100 lb. of other minerals

Evvard, or Professor Evvard as he is officially known at Iowa State College, is the best informed man in the country. Some interesting tests have recently been made under the direction of Professor Evvard which show that minerals play an important role in feeding hogs for market.

The basic ration used was shelled corn, self-fed; and a protein mixture to balance the ration, also self-fed. Different lots were fed various mineral mixtures and the results accurately noted.

These experiments are too elaborate to describe in detail here but complete reports will be sent to anyone requesting them from the Iowa State College, Ames, Iowa. These findings are, however, of special interest:

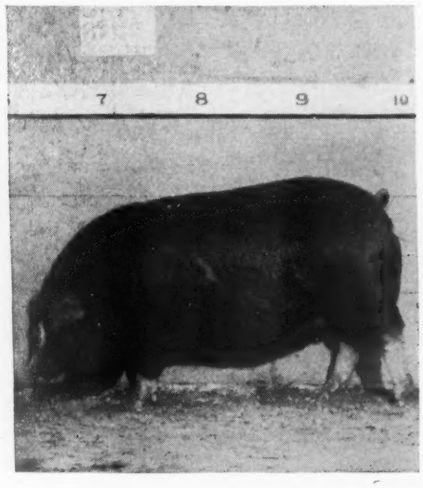
Salt is absolutely essential to any mineral mixture for feeding hogs, but salt alone is not enough.

One lot which showed up well was fed a mixture of salt, limestone (high calcium) and potassium iodide, the latter being used in very small quantities. Some of the other minerals which have been used in these experiments are potassium chloride, sulphur, sodium sulphate, magnesium sulphate, manganese sulphate, copperas, potassium aluminum sulphate (alum) and common sand.

It is surprising to find common sand used in a mineral mixture for fattening hogs. Certain experiments, however, indicate that it may have a decidedly beneficial influence on the digestive tracts of the animals, although it has no direct nutritive value.

It was found that every suitable mineral ration reduced the consumption of the expensive protein feed, effecting a considerable saving in feeding costs. The appetites of the hogs were also whetted so that they consumed more corn with correspondingly larger gains.

"The whole question of mineral feeding still needs much more light thrown upon



Courtesy Iowa State College

His ration contained simple minerals. Good gains were made by this porker but the lot to which he belonged, although helped by minerals, made smaller gain than the iodide fed and required more feed

it," say the Ames experts, "particularly with reference to the best formulas to be used under different circumstances of feeding."

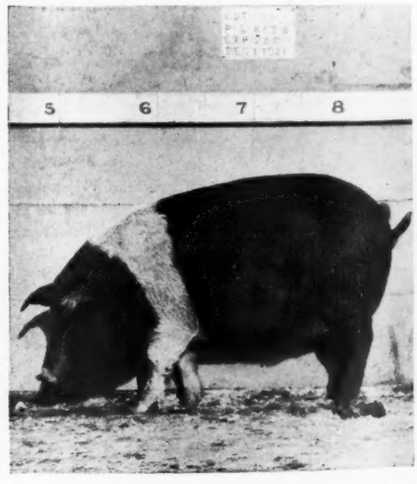
That there is a real legitimate market for mineral mixtures having salt as their base has been proven without question. The experimenters declare that the use of such a mixture would be very profitable, even at six cents a pound. The most of the mixtures used in their own work are valued at four cents a pound.

Of course, there are commercial mixtures already on the market, yet the surface has scarcely been scratched. Probably, the greatest mistake has been to try to make a single formula meet the needs of all kinds of livestock. Experiments have shown that hogs have particular needs not shared by other animals. Even for hogs, the mixtures need to be varied under different rations and environments. It has been found, for instance, that hogs on dry feed in mid-winter need a more complex mineral mixture than when on a good rape or alfalfa pasture.

Any manufacturer who is considering placing a mineral mixture for hogs on the market will do well to consult the feeding specialists. Success will depend largely upon securing the right formulas for specific purposes.

Practically two-thirds of all the hogs in this country are produced in the Corn Belt and the bordering states. Something over 45,000,000 hogs are received yearly at the various livestock markets of the country. At the time of the last census (January, 1920) there were over 12,300,000 mature breeding animals.

The marketing of mineral mixtures for hogs is not essentially different from the marketing of feeds. Indeed, a properly prepared mineral mixture is a supplemental feed. The series of mixtures should be given a suitable brand name. They may then be routed through the usual wholesale and retail channels for feeds. Or they may be sold direct by mail. In either case, advertising in the farm papers of the hog-producing states will be necessary to create a market of profitable volume.



Courtesy Iowa State College

His ration lacked minerals. He was fed a balanced ration of corn, cottonseed meal and blood meal without a mineral mixture. His group had poor appetites when compared with the other groups fed with simple mineral mixtures

The Cloth-Screen Type of Dust Arrester and Its Application to Cement Plants

How to Estimate the Ventilation of Portland Cement Plants

By Wm. A. Rosenberger, M.E.
Consulting Engineer, Rocky River, Ohio

WHILE the available space does not permit a very detailed treatise on the subject, a few of the main points will be discussed in such a manner as to permit the cement plant designer to make adequate provision for the necessary ventilating and dust-collecting equipment.

Adequate dust collecting systems in cement plants are today a recognized necessity, both from a financial as well as from a humanitarian standpoint. Plant after plant is falling in line; investigating, installing and finally immensely profiting by properly designed dust-collecting systems.

Most of the existing plants, however, are laid out in such a manner that it is very often rather difficult to find suitable locations for the dust arresters, fans and even for an economical run of piping.

As a rule, the dust arrester requirements are greatly underestimated, with the result that the final installation does not come up to the expectations of the owner. To avoid such disappointments to the owner and to help the designer of cement plants in reserving proper space for the necessary ventilating equipment, this short article is offered.

Considerations Involved in Dust-Collector Installations

While it is not possible to establish hard and fast rules regarding the amount of ventilation to be provided for all the various types and sizes of equipment used in a cement plant, the following considerations, properly applied, will enable the designer to arrive at sufficiently accurate data for preliminary estimates. It is, of course, highly advisable to consult with a specialist before the final plans are made, since each plant has its peculiarities which should be carefully studied. There are two general types of equipment to be considered:

1. Machines provided with dust connections by the manufacturer.

2. Equipment, such as elevators, screw conveyors, revolving screens, "Hum-mer" screens, bag wheels, etc., for which, as a rule, no ventilating connections are provided by the manufacturer.

In the first case an air velocity of between 3000 and 5000 ft. per minute is assumed, so that the amount of air required for satisfactorily ventilating such equipment is found by multiplying the area of the exhaust connection in square feet by the chosen air velocity in feet per minute. The proper velocity depends upon many factors, such as specific gravity, size (mesh) of material handled and quantity of material to be handled in a given time. Other factors entering are temperature, moisture contents and arrangement of piping. In this connection, attention may be called to the very common misconception that the velocity in vertical risers has to be higher than in horizontal runs of piping. In fact, the opposite is the case, which is easily explained, because in a vertical pipe the dust particles are more apt to be uniformly distributed over the whole area of the pipe than in a horizontal pipe where the particles have a tendency to drop and hug the bottom of the duct. For this

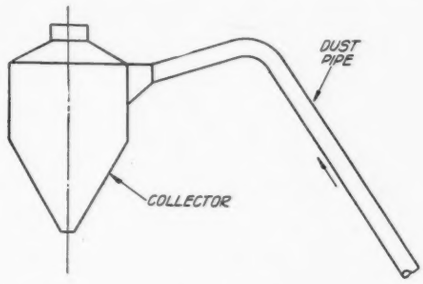


Fig. 1. Grasshopper arrangement used greatly by European engineers

reason European engineers still adhere to the so-called grassohpper arrangement, (Fig. 1) which, they claim is less subject to clogging than a horizontal pipe.

The object or purpose of ventilating systems in cement plants is twofold:

1. Recovery of otherwise wasted cement.
2. Improvement of working conditions.

The writer knows of a western cement plant, equipped with an up-to-date dust collecting system, which is collecting 83 tons of cement every 24 hours, or approximately 440 bbl., which amount, before installation of dust arresters was practically all wasted. The floor space required for the dust arresters is approximately six-tenths (0.6) of a square foot per barrel of regained cement per 24 hours.

Regarding the improvement of operating conditions we may say—with due apology to the originator of this slogan—"ask the man who has one." You can actually see and feel the difference the minute you cross the threshold of an up-to-date cement plant. *How to get best results:* The best way to confine dust is, to confine it at the point where it is created. For this purpose it is very important—and not always easy—to provide properly designed enclosures, or as we say "hoods," at those points. When designing hoods, it must be borne in mind that the air which is to be exhausted from them,

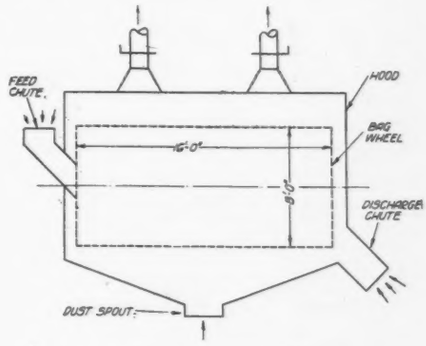


Fig. 2. Bag cleaning machine which is entirely enclosed

must be permitted to enter with as little resistance as possible, but at the same time, the free area between the apparatus to be ventilated and the walls of the hood must not be so large as to permit the dust laden air to float out. In other words, there must be sufficient "infiltration" at the hoods to prevent the escape of dust-laden air.

This point is of such importance, that it seems advisable to illustrate it by means of a simple example. Take, for instance, a bag cleaning machine as shown diagrammatically in Fig. 2, entirely enclosed, except for the following openings, which we assume shall have the free areas indicated:

1. Feed chute	6 sq. ft.
2. Discharge chute	8 sq. ft.
3. Dust spout	1 sq. ft.
Total	15 sq. ft.

Now, a wheel of the dimensions indicated and running at, say, 20 r.p.m. will have a peripheral velocity of approximately 500 ft. per min., and will act very much as a slow running fan would (the bags churning around, forming the fan blades). It will, depending upon the location of the bags inside, either draw air through the feed chute

and expel it through the discharge chute, or vice versa, with the result that clouds of dust are constantly visible at either opening, varying in intensity according to the momentary direction of air flow.

Under the conditions stated, a pressure varying between 0.01 and 0.02 in. water gauge is maintained on the inside of the wheel, corresponding to an outwardly tending air velocity of from 320 to 450 ft. per min. (with due consideration of various losses). It would therefore seem necessary to exhaust sufficient air from the hood to counteract this outward current. As we have explained above, the natural tendency would be for one opening to act as intake, while the other serves as exhaust or outlet for the dust laden air. For this reason it is sufficient to figure, in this case, on exhausting an amount of air which would cause an average infiltration velocity of about 225 ft. per min., through all the free openings, or $15 \times 225 = 3375$ cu. ft. of air per min.

Since in a bag wheel, the speed must not be so great as to cause the bags to be pressed against the wheel by centrifugal force, they will occasionally, either singly or in groups, flap over and in so doing the effect is the same as if the peripheral velocity of the wheel (or part of it) were suddenly increased, causing the internal pressure to rise. For this reason more air must be exhausted than figured above. In most cases 35% more will give satisfactory results, so that the air requirements for a bag wheel may be expressed as follows:

$CFM = 2.10 \times D \times A \times N$ (cu. ft. per min.)

where:

D = wheel diameter in feet
A = total free area in sq. ft.
N = revolutions per minute

It is seen from the above, that the amount of air necessary to satisfactorily ventilate a bag wheel is directly proportional to the size of the various openings *(A)*. If A can be reduced to half its original amount, the amount of ventilating air will be reduced to one-half, and with it the size of all other equipment such as piping, fan and dust arrester. Enormous savings can thus be obtained by proper hooding of the equipment to be ventilated. The proper diameter of D of the dust connection to a bag wheel housing may be determined as follows:

$$d_1 = 19.5 \sqrt{\frac{DAN}{V}} \text{ in. for a single connection.}$$

$$d_2 = 14.0 \sqrt{\frac{DAN}{V}} \text{ in. for a double connection (2 pipes)}$$

In these formulas D, A and N have the same meaning as before, while V is the velocity of the air in the ventilating pipe in feet per minute. If a piping system is properly designed and installed, a velocity of $V = 4000$ ft. per min. will be found ample for any application in cement plants, and in fact it may be dropped gradually as the pipe line approaches the dust arrester, until a velocity of not less than 3000 ft. per min., at the entrance to the dust arrester is reached. On this basis the above formulas become:

$$d_1 = 0.31 \sqrt{DAN} \text{ in.}$$
$$d_2 = 0.22 \sqrt{DAN} \text{ in.}$$

Similar reasoning will have to be applied to other equipment.

Regarding the ventilation of storage bins (over bagging machines, etc.) the opinions are divided. The writer holds the view that when bins are absolutely dust tight no artificial ventilation is required, but a vent opening, covered by some good quality dust arrester screen cloth, should be provided to permit the escape of air which is being displaced by the material fed into the bin.

The dust arrester should be centrally located with respect to the equipment to be ventilated. If the equipment is widely scattered it is often advisable to provide several independent units. It is also well to give the matter of dust removal from the arrester a good deal of thought. Often a location may be found such that the discharge spouts from the dust arrester hoppers lead directly to the storage bins or into a screw conveyor, which saves handling the dust by manual labor.

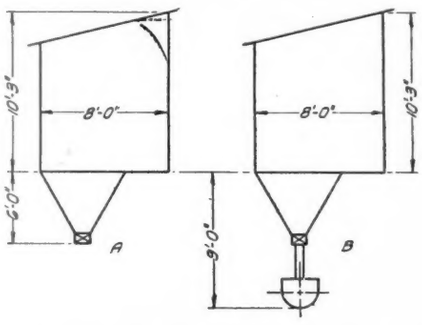


Fig. 3. Clearances required under dust arresters proper with and without screw conveyor connection

The clearance required under the dust arrester proper, for hoppers and valves, is approximately 6 ft. and, if a screw conveyor is desired to collect the dust from the various hoppers and convey it to a central point, it is well to allow an additional 3 ft., or about 9 ft. in all. The various makes of dust arresters vary, of course, somewhat in their dimensions, but a total height of about 10 to 11 ft. and a width of 8 to 9 ft. plus 18 to 24 in. all around for erection, will cover the space requirements of most standard makes. The length may be roughly estimated at 4 ft. for the first and 3 ft. for each additional 1000 cu. ft. of air handled.

The amount of power required to handle a certain amount of air depends very largely upon the resistance offered by the piping system, and will be the less, the shorter the pipes, the lower the air velocity, the larger the dust arrester and fan. Use as few bends as possible in your piping system and make elbows of liberal radius (not less than 2½ pipe diameters) wherever possible. Where two pipes join together, let them form an acute angle of 30 deg. or less. The friction loss in a certain length of pipe of a given diameter may be found in the formula:

$$F = \frac{L}{50d}\left(\frac{V}{4000}\right)^2 \text{ in inches water gauge}$$

where L is the length of pipe in feet, d the diameter in feet, V the air velocity in feet per minute, and the piping is assumed to be galvanized and of good workmanship. It is assumed that the reader is familiar with the methods used in determining piping friction losses, but for those less familiar we refer to Fig. 4 as a typical layout of a very simple pipe run. The above formula will, in this case, have to be applied to five individual pipes: A to B, B to C, C to D, D to E and F to G plus the loss of the pipe (if any) connected to the fan outlet. The sum of all these individual losses is the equivalent pressure in inches water gauge to overcome the friction in the various pipes. To this must be added the loss through the dust arrester, which, for good standard makes of arresters applied to the handling of cement may be estimated from the following formula used by the writer:

$$\text{Dust arrester loss} = 0.15x^2 + 0.0021\frac{CFM^2}{D^4}$$

inch water gauge

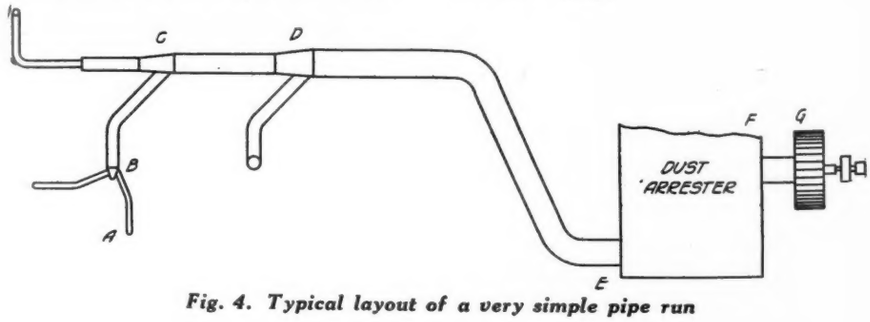


Fig. 4. Typical layout of a very simple pipe run

where: x = number of cubic feet of air per square foot of effective cloth area
D = diameter of pipe between the dust arrester and the fan in inches.
CFM = total air handled by the dust arrester in cubic feet per minute.

To the pipe-friction loss plus dust arrester loss must be added a velocity head corresponding to the velocity with which the air enters the farthest branch pipe (A in Fig. 4),

or $\left(\frac{V}{0.75\times4000}\right)^2$ where V is, as before, the velocity at the entrance to the pipe, and 0.75 a coefficient of contraction. The sum of all these various "losses" and velocity heads is approximately the operating pressure P of the fan and the size of the necessary motor may be found from:

$$\text{HP motor} = \frac{CFM\times P\times 1.2}{3500}$$

which assumes a fan efficiency of 55%.

In conclusion I wish to point out once more, that the formulas and other data given are not claimed to be scientifically accurate under all conditions. They are meant for estimating purposes and as such will be found reliable and conforming with best present-day practice. It is, however, recommended that cement-plant engineers avail themselves of the opportunities to consult with specialists in this line and that they do so early enough to assure that the ventilating system will work in harmoniously with all the other equipment instead of forming an appendix as, unfortunately, is so often the case where ventilating systems have to be added after the whole plant is completed.

The Human Element in Plant Operation*

By A. B. Mack

Assistant General Manager, Kelley Island Lime and Transport Co., Cleveland, Ohio

THE success of an organization depends upon the human element, from the executive down through the subordinates to the actual workmen. The executive's success or failure depends greatly on the soundness of his policies in dealing with men and his ability to radiate that policy through the rest of his organization. Many believe that only two factors are necessary to industrial success—capital and labor—but you all know that without good management the capital soon disappears and then there is no need for the labor. I do not mean that a sign on a door is all that is needed for management; it goes deeper than that, for the management must be sound in its policies in dealing with the men as well as in handling the rest of the company's business.

Foremost among the principles necessary to the solution of the problem of human element are confidence, justice and truth.

You are all familiar with the fact that the executives of large corporations having varied and scattered interests lost that personal contact with their employes that prevailed prior to the period of consolidation and expansion. It used to be that the management wintered and summered their employes, shared their joys and their sorrows, with the result that there existed a relationship that was invaluable both to the company and to the employes. With the coming of the large corporations the executive, having such a great amount of business to handle, had to depend upon reports—cold things at the best—and on his subordinates for his contact with the employes. Very often the subordinates, either in their zeal for a showing or from selfish motives distorted the facts in their reports, with the result that the opportunity presented itself for the agitator to get in his fine work. However, I believe that the pendulum is on the back swing now and infinite good will be accomplished in the coming years to re-establish a proper relationship.

When I said confidence is one of the essentials, I mean that the employer must have the confidence of his employes, and those subordinates whose duty it is to administer the company's affairs with the employes must gain the confidence of those directly under them. There may be different ways to gain this confidence, but the way to gain it and hold it is by justice. Remember that you are the judge and jury in the maintenance of a proper relationship between the company and its employes. You need the confidence of your men and you must be fair and just to your company and fair and just to your men in all matters that come up for your decision.

By truth I mean that it is absolutely necessary that truthfulness and honesty be cultivated. Truth is fact, and as a very able man recently said, "To take the hazard out of business, get the facts."

You will note that I have placed the burden upon the employer in order to accomplish the proper relationship between employer and employes. The employer or manager or executive is the outstanding personality in any organization and you will not often find the subordinates or employes rising above their superiors in the maintenance of principles. The average of employes has not undergone any great change, contrary to the often expressed idea that you cannot get as good men as you could years ago. We have found that the workmen of today have just as much pride in accomplishment and good workmanship as they ever had. This is one of the human element problems that many worry about. To illustrate this, I might mention a plant I knew about that had about 250 men working. The operating head of that plant always blamed his poor showing to the fact that none of his men were any good. Another man finally took charge and with the same organization except that he reduced the force to less than 175 men, immediately he turned the plant from red figures to black figures. Here the human element had failed, but the failure was not with the men, it was with their superior. You can spend millions for plant and equipment but you have to get back to the human element for ultimate success.

It is true that it is necessary to properly compensate an employe for his work. The best results are gained when the employe is happy in his environment and free from financial worry. The men are usually fair and it is usually when you have neglected them that they are led to do foolish things.

Intelligent discussion of important problems of wages and working conditions will ordinarily dispose of such matters to the satisfaction of both employer and employes. It is obvious that one man cannot discuss such matters with a mob, and for this reason they should be discussed between the management and a selected committee of the employes, the committee to be selected by the employes and in whom they have the same confidence that the stockholders have in the management.

None of these matters that I have mentioned depend for their success upon the sacrificing of either discipline or efficiency. The sacrifice of either destroys the confidence of employes in the management.

One of the very important means by which the principles I have stated may be maintained is the establishment and operation of the seniority rule in filling vacancies and making promotions. You are no doubt all familiar with it, but I believe it is a matter that is frequently misunderstood. Seniority puts hope and industry into your men. It takes away from the lesser supervisory men the opportunity to break down your organization by playing favorities or settling grudges. A rule of seniority in its practical operation will get a man a better job, but only that man's own ability will hold it for him. It takes time to get it working properly because individual cases will arise that need special handling, but once in force and practiced as it should be, it will work wonders with one of your very serious problems—labor turnover.

All of these things I have talked about are practical—they are practiced in what we take pride in believing is a successful organization.

*From a paper read at the Ninth Annual Convention of the National Crushed Stone Association, Montreal, Que., January 13, 1926.

Oski Electric Dust Collectors in European Cement Plants*

By C. Tsountas
Chemical Engineer

TWENTY-FIVE YEARS AGO little was thought of clouds of dust, consisting of more or less impalpable particles, which were produced in certain cement plants and rendered the atmosphere unfit for breathing.

Today things are different and everybody will agree on the necessity of collecting not only the dust produced by machinery in the course of handling the materials, but also that escaping in the waste gases of kilns and dryers.

The introduction of dust collecting devices in the cement industry appears necessary for three reasons:

1. Hygiene.
2. Recovery of dust particles of rock and cement constituting a certain value.
3. Utilization of waste gases.

Consequently, the problem of dust collecting in the cement industry has definite technical and economic advantages.

A number of devices exist for collecting dust. Among these are: dust chambers, dust filters, cyclones, washing devices, etc.

All of these processes are described with their relative advantages and disadvantages in various treatises on manufacture of cement. We will not stop to discuss these here.

However, a new dust collecting process, based on the use of high tension electric current, which was introduced a few years ago deserves special attention.

The first applications of this electric dust collecting process were made in industries other than the cement industry. However, as good results were obtained with it, it was soon introduced in the cement industry.

Different processes of electric dust collecting are now in existence.

The *Revue des Materiaux de Construction* has already published several articles on electric precipitation of dust by the Cottrell process and on its application in the cement industry.

On a recent trip through Switzerland, the author had occasion to visit several cement plants making use of the Oski process of electric dust collecting. This process requires two groups of apparatus:

1. A small high tension electric generating plant.
2. A dust chamber, called the reaction chamber, which constitutes the filter itself; the dimensions of this filter are a function of the volume of air which it is proposed to purify.

The air or gas loaded with dust is directed through the reaction chamber (Fig. 1) in which are suspended high voltage electrodes.

The positive electrode consists of a metallic grid and is connected to the source of electricity of high voltage; the negative electrode is a grounded semi-conductive concrete plate.

The air which is to be purified enters at one end of the reaction chamber and leaves at the other, upon being completely purified.

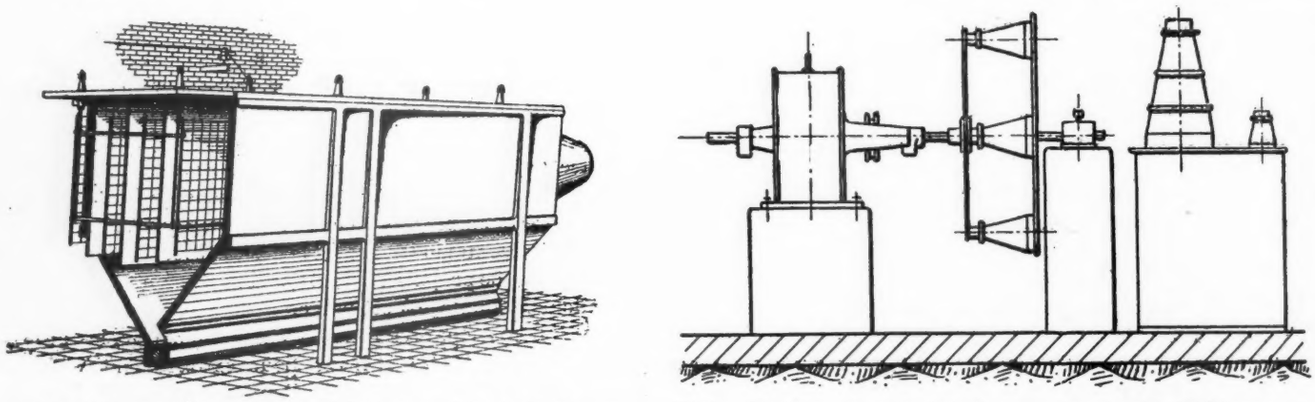
The precipitation of dust takes place at the negative electrode.

Under the action of the electric field existing between the electrodes, the dust particles charged with electricity become precipitated at the negative electrode, where they settle, gradually slipping into the hopper below the reaction chamber from where they are removed by means of a screw conveyor.

To facilitate settling at the negative electrode and to assure cleaning of the positive electrode which sometimes becomes covered with dust, a special device is provided which imparts shocks to the electrodes causing all deposited matter to drop.

Aside from this, due to the adopted arrangement, the resistance offered to the passage of the air current, which is to be purified, is practically insignificant.

The electric current required by this installation is generated in a small high tension power plant (Fig. 2) comprising as a rule the following units: a high tension transformer, an alternating current generator, a commutator and a distributing system.



Left—Electric precipitation chamber used in the Oski process. Right—High-tension electrical apparatus used in Oski process

The power required varies with the needs of the installation from 0.5 to 4 K.v.a. The dust chambers are built of concrete, masonry or steel.

As will be seen from the foregoing, the Oski process of dust collecting is one of the simplest and presents least inconveniences. Its efficiency is high for there appears to be no dust in the plants visited.

The directors of these plants stated that the cost of installation, which is not excessive, is offset by the value of the cement and rock dust recovered and that the regular operation of the installation entails practically no maintenance costs or supervision.

We have witnessed the Oski process successfully applied for collecting dust in preliminary dryers of rock, vertical and rotary kilns, crushing and grinding machinery, etc.

This is the reason why, having witnessed the most interesting results of its application, we consider that electric dust collecting indicates a marked step in the progress of dust collecting as used heretofore, and that we are hoping to see it extensively introduced in cement plants.

*Translated from Revue des Mat. de Constr. et des Trav. Publ. 330 (1925) by Margaret Arronnet, Chicago, Ill.

How United States Gypsum Company Gets Salesmen to Sell the Whole Line*

More Than Half the Battle Lies in Picking Good Men and Selling Them on the Line Before They Ever Approach a Dealer

By D. M. Hubbard
Editorial Staff, "Printers' Ink," Chicago, Ill.

FOR some months, now, contact has been the biggest single word in the sales department of the U. S. Gypsum Co. It is the spark that gets salesmen to sell the whole line of products and keep them from playing favorites.

In the opinion of the officers of the company, there is no short cut to getting the man out in a territory to sell all the products that the company manufactures. None is likely to be found. The contact that keeps a salesman from working in a groove is simply the unfolding of a sales promotion plan which starts with choosing the right sales timber, educating it, training it to sell, devising systems that tend to build the man up to the measure of the job and giving him the support of advertising and the cooperation of specialists.

In the last five years, the U. S. Gypsum Co. has brought out new building materials in rather rapid succession. Now it has 18 or 20 of them, sold through the lumber yard or the building materials dealer. In these same five years, the company's earnings have increased just about 500%. The reasons for that growth can be isolated and examined without much trouble. Two of them are: Advertising and the success of the management in getting its salesmen to sell the whole line.

It is possible in an organization of 300 salesmen, each selling 20 products, to get an even pressure back of the whole line only by educating those salesmen liberally and by keeping systematic contact with them, the highest executives of the company say. "Teaching them and keeping them taught," one of them says, "is the price we must pay for the kind of selling that exhausts the possibilities of every building job. Is it a high price? No. I can show you that any other policy amounts to flagrant extravagance.

"Take the salesman who thinks he has better luck selling with one or two products than with others. The first thing that his immediate superior knows he is riding these hobbies at a gallop through his territory. The competitor's salesman who follows him probably finds it easy to sell dealers on all but the one or two items. The hobby rider closes the door on them, but he leaves it wide open on ten or a dozen others. The dealer is going to buy them from someone. Today, they may look like small pickings, but they are all the opening that a smart competitor needs; and tomorrow our man finds himself crowded off the road.

"There is another consideration. Theoretically, every item in the line should bear its share of the advertising and selling cost. Actually, it is impossible to make every item stand its exact share, but that is our aim. You can't know where you are going if your eyes are shut."

How Men Are Hired

The real groundwork of training the company's salesmen to sell the whole line starts with hand picking men who can be made into the kind of salesmen that the company wants. A personnel manager makes it his business to find men. The company's rate of growth renders it imperative that a stock of raw sales material be kept on hand all the time. That material comes from the graduating classes of colleges, from the building trades sometimes, from advertising or from any other source that looks promising. When the personnel manager hires a man he is sent either directly to the company's sales school in Chicago or placed in the correspondence department. As a rule, the most satisfactory way is to give a man a year of detail work in the correspondence department followed by several weeks in school under a man of long sales experience.

Three or four weeks at sales school teaches a man to know three things. These are: The economic value of the building materials that he is going to sell, the company's sales methods and policies and the competition that he will have to meet. In school, he takes notes on all lectures and then transcribes these notes, making his own sales manual. By the time that he has done that for several weeks he has a fair hold on the rudiments, at least, of selling the company's materials. And by that time there is a job waiting for him. Some sales division has sent a requisition to headquarters.

Now whether the new man goes into a "hick territory" or whether the company decides to start him in as a specialty man selling only one product, he finds that he is still working under close supervision. School is not out.

Suppose he is given a small territory in which he is to sell the entire line. He is part of a sales division and over him are divisional sales manager and in addition a sales supervisor. One of the experienced specialty salesmen is never very far away from him. If he sells only one commodity, he has over him a commodity manager and a commodity sales supervisor. In either case, he knows where to look for help when he runs up against some problem that he can't solve for himself, and whether or not he bumps into difficulties a supervisor is going to put in an appearance to work with him at regular intervals.

There is nothing unusual to be found in the procedure outlined above, as any sales executive will recognize. However, the fact is worth noting that each one of these men gets plenty of support from two or three angles whether he calls for it or not. The company is long on liaison.

Some big sales organizations whose men are called on to sell many products insist that the salesman get back of the dealer's counter and actually sell at retail for him whenever that is feasible. The Armour and Co. salesman, for example, puts on a butcher's apron on Saturdays and helps his customers on this, their big day of the week.

The U. S. Gypsum salesman can't get behind the dealer's counter and help him. His dealer is the lumber yard owner and the building materials man who doesn't sell over the counter. However, he can and does get to his dealer's customers, the contractor and the owner of the building. As a rule, the architect is left to the company's specialty man who has only one product to push.

First of all, the salesman must know who is going to build in his territory. Then he must get in touch with the owner of the building and the contractor. There is room on most building jobs for every one of his 20 gypsum products. If he sells the gypsum idea to the owner and contractor, the dealer willingly buys, knowing his turnover is in sight.

For some years the company has stressed to salesmen and dealers the value and con-

*Reprint from *Printers' Ink.*

venience of buying a minimum order of a carload. Not a carload of plaster, of Sheetrock, Gyp-Lap, Rocklath or any other single product, but a car made up of all or most of the items in the U. S. G. line. The company has merchandised that idea successfully in spite of all the fear as to the consequences of hand-to-mouth buying on the part of retailers the country over. As the salesman puts it up to the dealer, this method of buying gives a dealer carload freight rates and all the other economies of carload buying plus the advantage of stocking only small lots of any single product which, of course, means quick turnover.

Dealers, today, understand the resale value of handling a uniform standard line that is heavily advertised as contrasted with under-advertised merchandise. Besides this, the mixed-car shipment does not put the same strain on a dealer's credit as buying in smaller quantities and scattering his orders among several jobbers. Many factors working together have combined to get distribution for all members of the company family but it is doubtful if any single factor has produced greater results than the mixed-car idea.

An Impressive Demonstration

Together with the companys' 300 salesmen, I sat in one of Chicago's armories a few weeks ago and watched demonstrations of probably a dozen different materials. The demonstrations were not just talks with lantern slides. They unloaded a lot of cinders, sand, brick, reinforcing rods, metal lath, timber and plasterers' equipment on the armory floor and rolled in a concrete mixer. Then they built a house. Not a completed house, of course, but enough of the outside walls, enough of the floors, enough of the partitions and inside walls to show just exactly how each U. S. G. product was used on the job. A commodity expert described in detail every operation that took place. The men used their eyes and ears and then asked a good many questions to make sure that they could satisfy the inquiring contractor out in their territories.

The general value of a practical demonstration such as this at a sales convention is too obvious to need much comment. The management decided to make this a star act for several special reasons. In the first place, selling the salesman on a product is half the battle. If he is sold himself, he is going to make short shrift of selling the man who has a real use for that product. Several items demonstrated were fairly new with the company and it is likely that a big proportion of the men present had never seen them being used on a building job. The demonstrations gave them much practical information on the proper use of various products and convinced them that the sale of one item of the company line could be made to carry with it the sale of several other items.

Probably any salesman can be sold on the intrinsic merits of his firm's merchandise by demonstration. But that isn't enough. Someone must show him how to merchandise the intrinsic merits of his products and what may be called the "extrinsic" merits as well. Right at that point his early schooling in the company's affairs begins to bulk large in importance. It is here that his faith in house policies comes to the surface and it is here that he has need of contact with his superiors in the sales organization. Here, too, he has a chance to make his company's advertising help him swing the dealer into line as a merchant of all his products.

"We educate our salesman to look on our advertising as a silent, co-operating salesman who creeps into the homes of his prospects and help make sales," says one of the company executives. "All salesmen are impressed with national advertising, with its breadth, with its prestige effect, but when most of them begin to figure up some kind of estimate of its worth to them in getting their quotas, they are apt to wish that the home office would focus the advertising so that it would hit their local needs. We have analyzed our national advertising coverage for every one of our sales territories. Our salesman knows how many copies of every publication that we advertise in nationally are going into his counties, towns and cities. These data let him go to his dealers with facts and figures that they will listen to, with a dealer advertising program that suits their budgets and with added reasons why they should be full-line dealers rather than dabblers.

"Six years ago, we first made Sheetrock wall board, but our sales were not a twentieth of what they are today. People didn't know about it. We couldn't afford to send a salesman to every prospect and tell him all about it. We could and did begin to advertise it nationally. Since then, the demand has doubled every year. The national advertising began in 1920. That year, our net earnings were a little over $2,000,000. Next year they ran a little over $2,500,000. We kept at it consistently and in 1924 decided that we ought to begin to use color pages in national mediums besides large schedules in the trade and business press. The net earnings by that time were nearly $9,000,000.

"Who would be so warped in judgment as to say that advertising has been the predominating factor in that rapid sales growth? Certainly no one who knows our history. The last few years have been a period of intense building activity. Our sales were bound to increase. Yet the advertising has done a job, both in introducing new products quickly and in getting the salesman and the dealer to push our full line in only a fraction of the time that would have been required using any other means."

This year, the company expects more intense competition. That means enrolling everyone who works for the company as a salesman. It means more pressure on the dealer to make him a full-line representative and more pressure to exhaust the sales possibilities of every building job. To handle this difficult job, the company has organized its sales department along military lines. For each commodity in the line there is a commodity manager, several commodity supervisors and a group of specialty men who can sell and demonstrate. Then there is the great body of line salesmen working in divisions with a division sales manager at the head of each. Under him are sales supervisors whose jobs are direct co-operation with the territory salesmen, the real spearheads of the whole organization.

If a particular territory stagnates, the sales supervisor jumps in to bring it back to life if that is possible. If some particular product can't seem to break into the market, one of the specialty men comes in as a trouble shooter to help put it across. The whole idea is flexibility and mobility of selling forces with every territory salesman constantly in contact with selling help.

Office Workers Are Posted

During one afternoon of the recent sales convention the offices were closed and all the clerks, correspondents, stenographers and filing girls were taken to the convention hotel some eight miles away. In the hotel ballroom, a series of exhibit booths had been built, one for each product that the company makes. The employes were divided into groups of seven or eight, one person being appointed in each group to act as leader and keep the party together. The leader had a chart of the various exhibits. As she led her group to each booth, the man in charge of the exhibit gave a short talk on the product displayed there. When he had finished, the leader had him initial the chart that she carried and the group went on to the next booth.

In this way, some 500 office employes got a quick but effective bird's-eye view of the entire line of products and learned something about their uses. That afternoon is going to pay big dividends, the company officials believe. The next time that someone dictates a letter which talks about insulation, efflorescence or calcination, there will be less likelihood of errors and misunderstanding creeping in. It is going to mean better correspondence, quicker handling and a better grasp of a thousand and one details of the company's business. And it will indirectly, at least, promote sales.

"Every one of our office employes has friends who are building from time to time," an executive told *Printers' Ink*. "It is only natural that those people should ask anyone who is employed by us about our materials. That may be done to get information or it may simply spring from a desire to make conversation. In either case, there is a selling opportunity to be capitalized. If it happens that our employes can talk intelligently about plaster, sheathing, wallboard and stucco, more of our products are going to be sold. Every one of our office employes will

build for themselves some day or influence building.

Every Employe a Salesman

"The mark we are shooting at is to make everyone who works for us an informed salesman who can be of some service to the prospective builder. One of the keenest pleasures that I know is to take a shy, diffident boy just out of school and by surrounding him with good merchandise and the right kind of contacts make him into a self-reliant salesman who is sold on our line, who makes people like to deal with him and who will work hard for and with us. That is building sales. It is building permanence for our company. And most important of all it is building men."

Right of Seller of Cement to Restrict Resale or After Use by Buyer

Mississippi Case Affirms Right of Manufacturers to Limit Use of Cement to Specific Job

By Leslie Childs
Greenfield, Ind.

THE QUESTION of the right of a seller of cement to restrict the after use of same by the buyer is one of considerable importance to dealers, contractors and builders, in general. In other words, what are the legal rights of one who sells cement in respect to binding the buyer not to resell, and perhaps restrict the use of the material involved to a particular piece of work or contract?

As may be expected this question has been the subject of considerable litigation, and, while the point cannot be covered by the statement of a hard and fast rule, it seems restrictions of this kind will be enforced by the courts where the restraint is reasonable. And as an illustration of what the courts have held to be a "reasonable" restraint in situations of this kind the Mississippi case of Gano vs. Delmas, 105 So. 535, is worthy of a brief review.

Facts in Special Case

In this case the plaintiff was a dealer in cement, and entered into a contract to furnish the defendant, a road contractor, with about 30,000 bbl. of a certain brand of cement. Under the terms of the contract the cement was to be furnished at $3.32 per barrel, which was stipulated to be the maximum price, with the understanding that the defendant was to have the benefit of any decline in price that might occur during the process of construction of the road in question. The contract further provided:

"'The quality of Royal cement mentioned on the reverse side thereof is sold and delivered for the use in the work described, and if the buyer shall sell or otherwise dispose of any portion of said cement or use any portion thereof in any work other than that described,' appellee (seller) at his option shall have the right to decline further deliveries, etc."

Following the execution of this contract, the plaintiff delivered about 5000 bbl. of cement. The defendant claimed there had been a decline in the price, and after some negotiation a reduction of 12 cents per barrel was made. The defendant however, it seems, was not satisfied with this, for he declined to receive any more cement from the plaintiff under the contract on the ground that the market price was only $2.82 per barrel in the city of New Orleans.

A dispute followed which culminated in the plaintiff bringing the instant action for damages claimed to have been suffered by the failer of the defendant to receive the balance of the 30,000 bbl. of cement named in the contract.

Upon the trial of the cause it developed that while cement could be purchased in New Orleans at $2.82 per barrel, the freight on some to the locality in Mississippi where the defendant was operating would have brought the price up to that asked by the plaintiff. In view of this the court held that defendant's objection to receiving the cement on account of the price was not well taken, and would not be upheld as a reason for not abiding by the contract.

However, the defendant further contended that the contract should not be enforced against him because of the provision heretofore quoted which restricted his after use of the cement. The claim being that such restriction was in restraint of trade and violated the anti-trust statute. In reviewing the record and stating the question before it the court, in part, said:

Restriction in Use of Cement

"It will be observed from the terms of the contract that the amount of cement purchased by appellant (defendant) was limited to the requirements of this particular road project, estimated to be about 30,000 bbl. The question is whether or not the provision in the contract, by which appellant agreed not to sell or otherwise dispose of any portion of the cement so bought, or to use any portion thereof on any other work than the 'Spanish Train' project, was such a restraint of trade as is violative of our anti-trust statute. Certainly it was a partial restraint of trade. The contract, if carried out, would operate to restrain trade to some extent. But that is not the criterion. * * *"

Following the above statement of the question before it, the court directed its attention to the circumstances leading to the contract, and the character of the restraint imposed, to ascertain if it in any way violated the law. In passing upon this question the court, among other things, said:

"The restraint of trade involved under this contract consisted simply in this: That appellant should take the 30,000 bbl. of Royal cement, the estimated requirements for the construction of the road project he had under contract, and use it exclusively on that road construction; that he would use no other cement, and would not dispose of any part of the cement so purchased by him to any other person or for use on any other work.

"To begin with, appellant had all the cement dealers in the country to purchase from. After he refused further deliveries from appellee (plaintiff), he went out into the open market and bought another brand of cement with which to finish his contract. The same markets were open to him before he contracted with appellee. We are of opinion that the restraint of trade resulting from this contract was reasonable, and therefore not inimical to the public welfare. * * *"

What the Court Decided

In conclusion the court affirmed a judgment in the sum of $2,533.16 recovered in the trial court by the plaintiff as damages for the defendant's failure to accept the cement contracted for. Holding, as outlined in the opinion, that the provision in the contract limiting the defendant's use of the cement to the named project, and forbidding the sale of any portion of it, was not violative of the law as being in restraint of trade. In other words, it was a reasonable restriction and would be upheld by the courts.

Hints and Helps for Superintendents

Stone Box to Turn Crusher Discharge to Elevator

A VERY neat arrangement to turn the discharge of a crusher into the elevator that takes it to the screen is shown in the picture. It was taken at the stone-crushing plant of the Missouri Portland Cement Co. at Sugar Creek near Kansas City, Mo.

Stone box for turning crusher discharge

The discharge from the crusher slides down a 45-deg. chute into a steel stone box. This is 3 ft. long, 5 ft. wide, and 5 ft. deep. It is set at right angles to the chute so as to turn the discharge into the elevator shown which has 36-in. buckets.

The fall of the stone is checked as it enters the box. Enough stone always remains in the box to form a bed over which the incoming stone slides. In this way wear on the box is prevented.

Boom Extension for Hoisting and Placing Screens, Etc., Where Regular Boom Will Not Reach

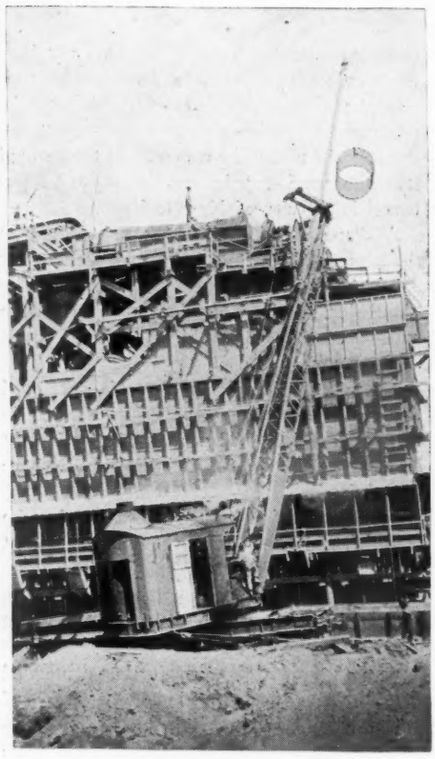
By F. A. JONES
Superintendent, Atlas Rock Co., Oakdale, Calif.

MATERIAL REQUIRED:

Pole 36 ft. in length, 1 ft. diameter at larger end; two 1-in. U-bolts.

Frame made from 6x8-in. pieces.

Fasten pole to boom with two 1-in. U-bolts, inserting block of wood between the lattice work on boom to keep pole from sliding down, run one line over bracing frame and tie at end of pole.



Boom extension for hoisting and placing screens, etc., where regular boom will not reach

A very short time is required to change from clamshell bucket to this device which gives you an 80-ft. boom that will handle 2500 lb. with ease and facilitate the placing of screens, etc., in places where regular boom will not reach. With this arrangement we have been able to dismantle and place new screen sections in a 60-in. by 24-ft. roller type screen, all screen sections being hoisted from ground to top of bunkers and placed directly in screen.

In the view, the crane was operating on a 5% grade, block and tackle being used to keep it from swinging when placing screens.

A System of Storing Crushed Stone

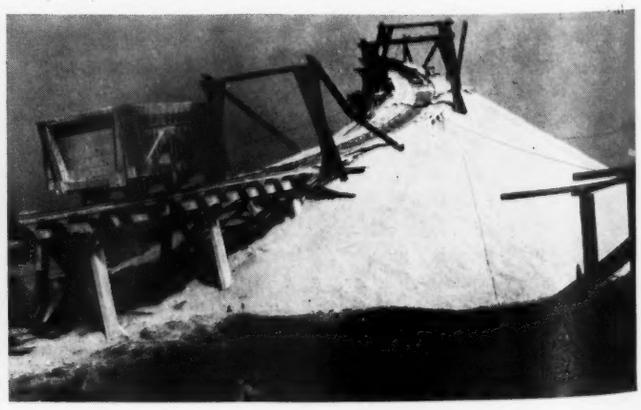
AT the plant of the Camp Concrete Rock Co., near Brooksville, Fla., a system of storing crushed stone is used that has some good points. There are two storage piles, one for fine material and one for coarse. Each of these is built under a trestle by a self-dumping car which is pulled up and on to the trestle by a hoist.

The car dumps through side doors which are held in place by a latch. This latch projects below the body of the car so that it can strike a tripping piece attached to the car at the proper point.

The cars are loaded at the plant bins. Each holds about two yards. They are then pulled up the track by a rope which follows the track to the end where it passes over a sheave and then comes back above the track, being supported on the frames which show in the picture. The hoist house is between the two storage piles and near the point where the cars are loaded.

The hoist is a two-drum hoist with post brakes. One drum serves each storage pile.

Car for taking stone to storage



Car on the storage track

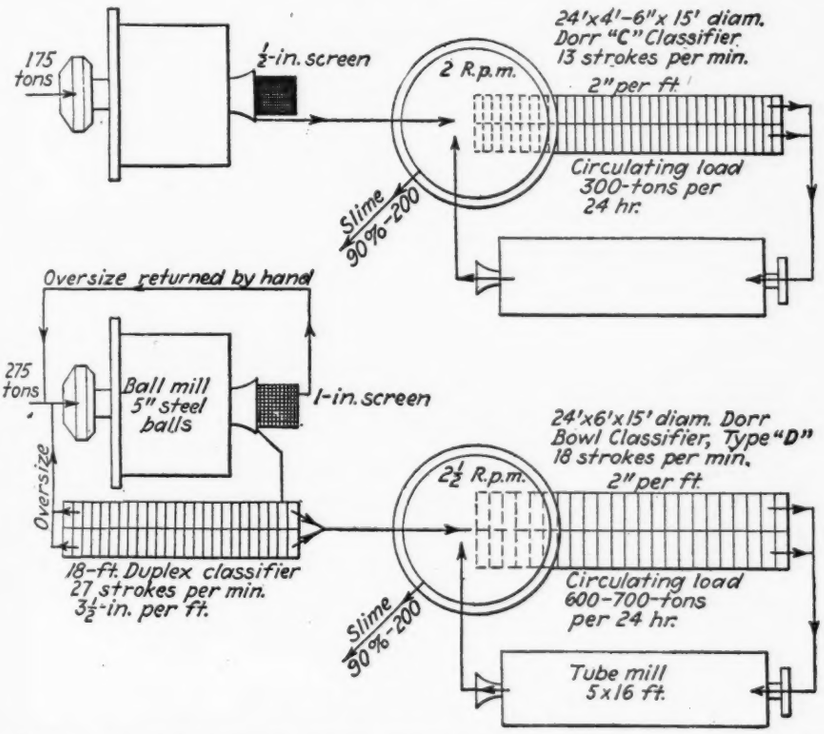
As is shown in the picture, the trestle swings around on a curve. The rope coming from the car runs against a vertical roller on one side of the track which keeps the pull almost straight with the track.

This system is simple and fairly economical in its first cost. As compared with a conveyor belt system, however, it has the disadvantage of requiring labor both to load the cars and run the hoist. Of course it would be easy to arrange matters so that one man could attend to both jobs.

Economy of Closed-Circuit Grinding

THE GRINDING PROBLEMS of the mining industry and of the portland cement industry have much in common. Progress in solving these problems has been made in both industries, more or less independently of the other. Once in a while a mining engineer makes a contribution of interest to portland cement manufacturers, and one of these contributions is that of H. W. Shoemaker, mill superintendent, Lake Shore Mines, Kirkland Lake, Ont., in *Engineering and Mining Journal-Press* of February 27. Mr. Shoemaker states:

The advantages of closed-circuit grinding and classification in each of the successive steps of wet-grinding installations have always been taken more or less for granted. Results recently attained at the Lake Shore Mines, by closed-circuiting classifiers with primary grinding units, gives striking evidence of the improvements possible by a complete application of this principle. The original unit in this mill consisted of a 7x6-ft. ball granulator delivering to a 24-ft. by 4-ft. 6-in. by 15-ft. diameter duplex Dorr bowl classifier of the lighter type known as Type "C." This classifier was in closed circuit with a 5x16ft. tube mill using 1¼-in. steel pebbles. Feed to this unit was the product of 54x24-in. rolls delivered to the mill bins without screening at approximately minus 1 in. The finished product was approximately 90% through 200 mesh at the bowl overflow. Under these conditions, and with the classifier making 13 strokes per minute, the maximum tonnage per 24 hours was 175 tons. Forcing tonnage beyond this point usually resulted in mechanical troubles with the raking mechanism of the classifier. This trouble was partially remedied by speeding the rakes up to 20 strokes per minute, thus giving increased raking capacity but decreasing the load per stroke. This improvement, together with reinforcement of the head motion, enabled the unit to handle 190 to 200 tons.


175 tons
½-in. screen
2 R.p.m.
24'x4'-6"x 15' diam. Dorr "C" Classifier 13 strokes per min.
2" per ft.
Circulating load 300-tons per 24 hr.
Slime 90%-200
Oversize returned by hand
275 tons
Ball mill 5" steel balls
1-in. screen
Oversize
18-ft. Duplex classifier 27 strokes per min. 3½-in. per ft.
2½ R.p.m.
24'x6'x15' diam. Dorr Bowl Classifier, Type "D" 18 strokes per min.
2" per ft.
Circulating load 600-700-tons per 24 hr.
Slime 90%-200
Tube mill 5x16 ft.

At top is shown the original circuit. Below is the revised arrangement with the primary ball mill in closed circuit with a classifier

Heavier Classifiers Installed

Mechanically, however, the Type "C" classifiers were too light for the job, and it was determined to replace them with the heavy-duty Type "D" of the same length and bowl diameter, but 6 ft. in width. By this change it was hoped to get away from the occasional breakage of the lighter model; and by providing a heavier circulating load for the tube mill, to increase its efficiency. Their installation provided these improvements, and the duty was further increased to 225 tons per 24 hours.

Throughout these successive conditions, the ball granulator was running below capacity because of the necessity of favoring the classifier and tube mill. The limiting factor seemed to be the small percentage of oversize delivered by the ball mill, which accumulated in the tube and classifier circuit to a prohibitive degree. To meet this excess of capacity of the ball mill over the tube, and to make use of the discarded "C" models, the bowls were removed from these classifiers, and the raking compartments cut down to 18 ft. and put in closed circuit with the ball mill. They were steeply pitched—3½ in. to the foot—and the rakes speeded up to 27 strokes per minute. The trunnion discharge of the ball mill had originally been provided with a cylindrical screen of ½-in. mesh. This was replaced with one of 1-in. mesh. Operators are instructed to load the mill until some oversize passes this screen, but the total so overfed does not exceed 500 lb. per day.

The moisture on this primary classifier is naturally kept quite low, only the coarser material being raked back and returned to the ball mill. The whole arrangement, however, is very flexible, and practically any desired sizing of product is possible. The practical effect is the elimination of that small percentage of oversize heretofore sent to the fine-grinding circuit, a finer average material for the tube mill to handle, and a better balancing of the capacities of ball and tube mill. Furthermore, both mills are properly loaded, it is possible to carry lower moistures, and the resultant saving in steel is considerable. In addition, the total power consumed per unit is 15 h.p. less, despite the fact that the daily duty is now 275 tons compared with the 175 tons possible before the foregoing changes in operation were made.

Following are some pertinent figures of comparison. The sketches show the present and original arrangements.

COMPARISON OF ADVANTAGES BROUGHT ABOUT BY CHANGE

			Power			
	5-in. balls	1-in. balls	Ball Mill, h.p.	Tube, h.p.	Classifier, h.p.	Cost, cents per ton
Original	2.8 lb. per ton	3.1 lb.	135	165	5	36.3
Present	1.9 lb. per ton	1.5 lb.	125	150	15	21.7
Saving	0.9 lb. per ton	1.6 lb.	10	15	10	.....
	$0.04	$0.08	.....	.....	.....	14.6

Assuming that liner consumption is decreased half as much as the ball consumption (no data are as yet available), an additional $0.06 per ton would be added to the saving already shown. This makes a total saving on these items alone of 32.6c per ton. The material crushed is hard red porphyry and syenite.

Financial News and Comment

RECENT QUOTATIONS ON SECURITIES IN ROCK PRODUCTS CORPORATIONS

(These are the most recent quotations available at this printing. Revisions, corrections and supplemental information will be welcomed by the editor.)

Stock	Date	Par	Price bid	Price asked	Dividend rate
Alpha Portland Cement Co. (common)**	Mar. 16	100	133	135	1¾% quar. 25% ex. Dec. 1
Alpha Portland Cement Co. (preferred)**	Mar. 16	100	114	.....	1½% quar. Sept. 1
Arundel Corporation (sand and gravel—new stock)	Mar. 16	No par	33	33	30c quar., 60c ex, Jan. 2
Atlas Portland Cement Co. (common)	Mar. 16	No par	51⅞	53⅝	50c quar.
Atlas Portland Cement Co. (preferred)	.....	100	.....	.....	2% quar. Oct. 1
Atlas Portland Cement Co. (preferred)**	Mar. 16	33⅓	44	48	2% quar. Oct. 1
Bessemer Limestone and Cement Co. (common)‡	Mar. 12	100	145	160	1½% quar. Jan. 1, 4% ex. Jan. 1
Bessemer Limestone and Cement Co. (preferred)‡	Mar. 12	100	106½	109	1¾% quar. Jan. 1
Bessemer Limestone and Cement Co. (convertible 8% notes)‡	Mar. 12	.....	121	135	8% annual
Boston Sand and Gravel Co. (common) (r)	Mar. 11	100	60	75	2% quar. July 1
Boston Sand and Gravel Co. (preferred) (d)	Jan. 15	.....	.....	80	1¾% quar. Oct. 1
Boston Sand and Gravel Co. (1st preferred) (d)	Jan. 15	.....	.....	90	2% quar. Oct. 1
Canada Cement Co., Ltd. (common)	Mar. 16	100	110	110¾	1½% quar. Jan. 16
Canada Cement Co., Ltd. (preferred) (f)	Mar. 11	100	117	118	1¾% quar. Feb. 16
Canada Cement Co., Ltd. (1st 6's, 1929) (f)	Mar. 11	.....	102	103	3% semi-annual A&O
Canada Crushed Stone Corp., Ltd. (6½s, 1944) (f)	Mar. 11	100	93	96	
Charles Warner Co. (lime, crushed stone, sand and gravel)	Mar. 15	No par	23	25	50c quar. Jan. 11
Charles Warner Co. (preferred)	Mar. 15	100	101	.....	1¾% quar. Jan. 28
Charles Warner Co. (lime, crushed stone, sand and gravel) 7s, 1929 (r)	Mar. 11	100	105	106½	
Cleveland Stone Co.	Mar. 18	.....	152	152⅛	1½% quar., Mar. 1, 1% ex. Mar. 1
Connecticut Quarries Co. (1st Mortgage 7% bonds) (s)	Mar. 11	100	104½	.....	
Dolese and Shepard Co. (crushed stone) (a)	Mar. 17	50	75	78	$1.50 quar. Jan. 1
Giant Portland Cement Co. (common)**	Mar. 17	50	41	41	
Giant Portland Cement Co. (preferred)**	Mar. 16	50	47	48½	3½%s.-a. Dec. 15, plus 10% arrears.
Ideal Cement Co. (common)‖	Mar. 16	No par	80	85	$1 quar. Jan. 2. 50c ex Dec. 27
Ideal Cement Co. (preferred)‖	Mar. 16	100	107	110	1¾% quar. Jan. 2
International Cement Corporation (common)	Mar. 17	No par	64½	64½	$1 quar. Mar. 31
International Cement Corporation (preferred)**	Mar. 17	100	102	102	1¾% quar. Mar. 31
International Portland Cement Co., Ltd. (preferred)	Mar. 1	.....	30	45	
Kelley Island Lime and Transport Co.	Mar. 17	100	120	124½	$2 quar. $2 ex. Jan. 2
Lawrence Portland Cement Co.**	Mar. 16	100	110	.....	2% quar.
Lehigh Portland Cement Co.‖	Mar. 16	50	88	92	1½% quar.
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially up to 1930) (k)	Mar. 12	100	99	100	
Lyman Richey Sand and Gravel Co. (1st Mort. 6s, expire serially from 1930 to 1935) (k)	Mar. 12	100	97	100	
Michigan Limestone and Chemical Co. (common)‖	Mar. 13	.....	24½	.....	
Michigan Limestone and Chemical Co. (preferred)‖	Mar. 13	.....	24½	.....	1¾% quar. July 15
Missouri Portland Cement Co.	Mar. 16	25	59	60	50c quar. Feb. 1
Monolith Portland Cement Co. (common) (c)	Mar. 12	.....	9½	10	
Monolith Portland Cement Co. (units) (c)	Mar. 12	.....	26	27½	
Monolith Portland Cement Co. (preferred) (c)	Mar. 12	.....	8¼	8¾	
Newaygo Portland Cement Co.*	Mar. 11	.....	125	.....	
New England Lime Co. (Series A, preferred) (i)	Jan. 29	100	96½	99	
New England Lime Co. (Series B, preferred) (i)	Jan. 29	100	96½	99	
New England Lime Co. (V.T.C.) (i)	Jan. 29	.....	23	25	
New England Lime Co. (6s, 1935) (m)	Mar. 11	100	99	100	
North American Cement Corp. 6½s 1940 (with warrants)	Mar. 16	.....	98	98	
North American Cement Corp. (units of 1 sh. pfd. plus ½ sh. common) (z)	Feb. 27	.....	94	99	2 mo. period at rate of 7%
North American Cement Corp. (preferred)	Dec. 31	.....	.....	.....	1.75 quar. Feb. 1
Pacific Portland Cement Co., Consolidated (§)	Mar. 12	100	95	96	½% mo.
Pacific Portland Cement Co., Consolidated (secured serial gold notes)§	Mar. 12	.....	99¾	100	3% semi-annual Oct. 15
Peerless Portland Cement Co.*	Mar. 11	10	6	7	
Petoskey Portland Cement Co.*	Mar. 11	10	10	.....	1½% quar.
Rockland and Rockport Lime Corp. (1st preferred) (d)	Feb. 17	100	98	99	3½% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (2nd preferred) (d)	Jan. 15	100	.....	70	3% semi-annual Feb. 1
Rockland and Rockport Lime Corp. (common) (d)	Feb. 1	No par	.....	60	1½% quar. Nov. 2
Sandusky Cement Co. (common)*	Mar. 17	100	132½	133	$2 quar. $3 ex. Dec. 31
Santa Cruz Portland Cement Co. (bonds) (§)	Mar. 12	.....	104	.....	6% annual
Santa Cruz Portland Cement Co. (common) (§)	Mar. 12	50	85	92	$1 quar. $1 ex. Dec. 24
Superior Portland Cement, Inc. (new stock) (6)	Feb. 26	.....	44	44½	
United States Gypsum Co. (common)	Mar. 17	20	142½	142½	2% quar. Mar. 31,
United States Gypsum Co. (preferred)	Mar. 16	100	115	118	1¾% quar. Mar. 31
Universal Gypsum Co. (common)†	Mar. 17	No par	17½	18½	
Universal Gypsum V. T. C.†	Mar. 17	No par	17½	18½	
Universal Gypsum Co. (preferred)†	Aug. 5	.....	76	.....	1¾% quar. Sept. 15
Universal Gypsum Co. (1st mortgage 7% bonds)†	Mar. 17	.....	99	(at 6½%)	
Union Rock Co. (7% serial gold bonds) (y)	Mar. 13	100	99	101	
Wabash Portland Cement Co.*	Aug. 3	50	60	100	
Wisconsin Lime and Cement Co. (1st Mort. 6s, 1940) (o)	Feb. 25	100	98½	100	
Wolverine Portland Cement Co.	Mar. 15	10	7	7	2% quar. Aug. 15

*Quotations by Watling, Lerchen & Co., Detroit, Mich. **Quotations by Bristol & Willett, New York. †Quotations by True, Webber & Co., Chicago. ‡Quotations by Butler, Beadling & Co., Youngstown, Ohio. §Quotation by Freeman, Smith & Camp Co., San Francisco, Calif. ‖Quotations by Frederic H. Hatch & Co., New York. (a) Quotations by F. M. Zeiler & Co., Chicago, Ill. (b) Quotations by De Fremery & Co., San Francisco, Calif. (c) Quotations by A. E. White Co., San Francisco, Calif. (d) Quotations by Lee, Higginson & Co., Boston, Mass. (f) Nesbitt, Thomson & Co., Montreal, Canada. (i) E. B. Merritt & Co., Inc., Bridgeport, Conn. (k) Peters Trust Co., Omaha, Neb. (m) Second Ward Securities Co., Milwaukee, Wis. (o) Central Trust Co. of Illinois, Chicago. (r) J. S. Wilson Jr. Co., Baltimore, Md. (s) Chas. W. Scranton & Co., New Haven, Conn. (y) Dean, Witter & Co., Los Angeles, Calif. (z) Hemphill, Noyes & Co., New York. (6) Quotations by Bond & Goodwin & Tucker, Inc., San Francisco.

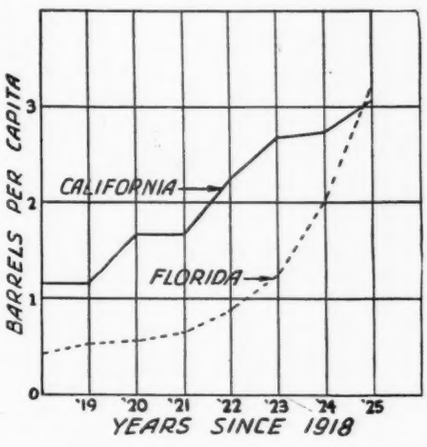
QUOTATIONS ON INACTIVE ROCK PRODUCTS CORPORATION SECURITIES ON PAGE 86

Editorial Comment

A man prominently identified with cement manufacture in the South sees no reason for apprehension in the probable tremendous expansion of the portland cement industry in that section in the next year or two. (There are at least six new mills contemplated or under construction in the South.) He says if all the states had as high a per capita consumption as California (3.06 bbl.) the present annual output of portland cement in the United States could be doubled. Florida already has a per capita consumption greater than California. The per capita consumption of these states is more than six times that of the states having the lowest per capita consumption (0.5 bbl.).

Possibilities in Cement

The 16 states in which per capita consumption was above the general average, in 1925, were California, Delaware, District of Columbia, Florida, Illinois, Indiana, Michigan, Missouri, New Jersey, New York, Ohio, Oregon, Pennsylvania, Washington, Wisconsin and Wyoming. Maryland has just the average consumption, and all the other states have less than the average. The nine states whose per capita consumption is about 0.5 bbl. per capita or less are Arkansas, Georgia, Idaho, Maine, Mississippi, Montana, New Mexico, North Dakota and South Carolina. Four of these are Southern states and three are Rocky Mountain.



All of the states which have a high per capita consumption are notable, among other things, for concrete highway construction, except Wyoming. What caused an increase 0.5 bbl. per capita consumption in 1925 in Wyoming we do not know, but very likely some few big pieces of engineering construction such as a dam, or oil reservoirs. This often accounts for big temporary jumps in per capita consumption of the more sparsely settled states. In all the other states having a high per capita consumption, the consumption is accounted for by healthful activity in not one, but all branches of construction, and the per capita consumption has apparently been raised to a high level to stay, or as a step to still higher levels.

The increase in per capita consumption is, in most cases, a matter of steady growth due to the adoption of concrete for more and more purposes. In 1919 California's per capita consumption was 1.14 bbl. It grew by fairly regular steps to its present figure of 3.06 bbl. In 1919 Florida's per capita consumption was 0.53 bbl. It did not change much until 1922; since then it has gone upward at an ever increasing rate. Probably per capita consumption in other states will rise by similar regular stages to California's present figure, but we shall probably have few instances like Florida's spectacular increase in consumption.

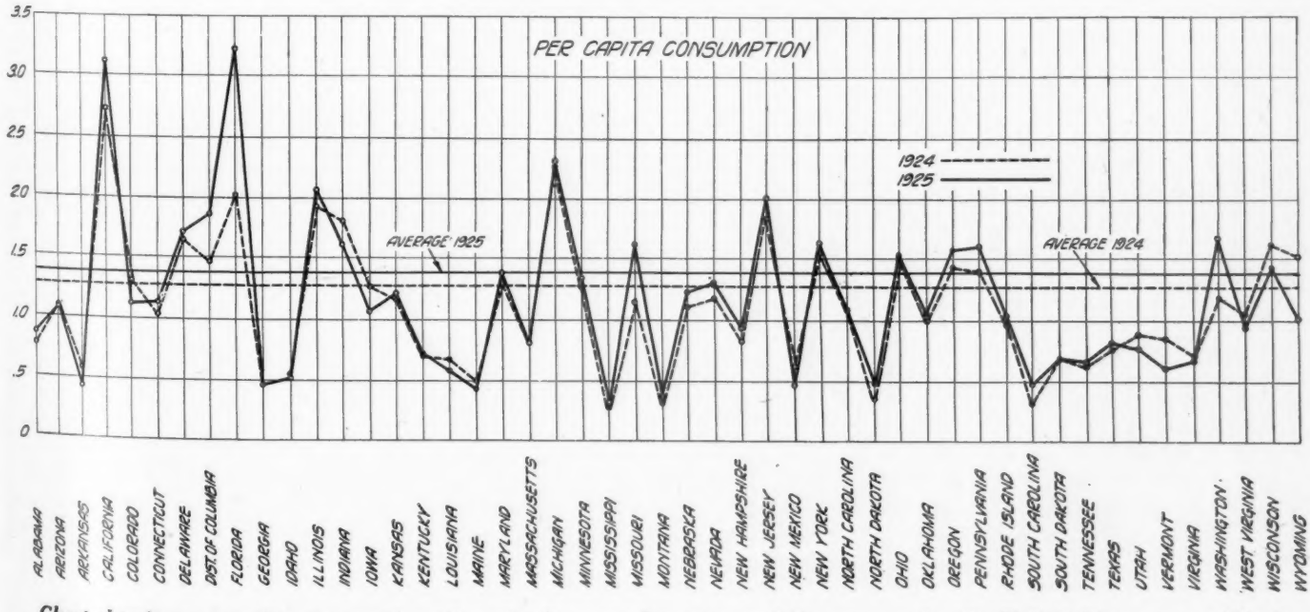


Chart showing per capita consumption of portland cement by states and the average for the United States as a whole for the years 1924 and 1925—Above, increase in per capita consumption 1918-1925 in California and Florida

QUOTATIONS OF INACTIVE ROCK PRODUCTS SECURITIES

Stock	Date	Par	Price bid	Price asked	Divided rate
Coplay Cement Mfg. Co. (common) (4)	Dec. 16	.....	12½	.....	
Coplay Cement Mfg. Co. (preferred) (1)	Dec. 30	.....	70	.....	
Eastern Brick Corp. (7% cu. pfd.) (1)	Dec. 9	10	40c	.....	
Eastern Brick Corp. (sand lime brick) (common) (1)	Dec. 9	10	40c	.....	
Edison Portland Cement Co. (common)	Nov. 3	50	7½c(x)	.....	
Edison Portland Cement Co. (preferred)	Nov. 3	50	17½c(x)	.....	
Lime and Stone Products Co. (1100 sh. pfd., $10 par and 700 sh. com., $10 par)	Feb. 10	.....	$66 for the lot	.....	
Missouri Portland Cement Co. (serial bonds)	Dec. 31	.....	104¾	104¾	3¼ % semi-annual
Olympic Portland Cement Co. (g)	Oct. 13	.....	.....	£1⅝	
Phosphate Mining Co. (2)	Nov. 25	.....	1@5	.....	
Pittsfield Lime and Stone Co. (preferred)	.....	100	.....	.....	2% quar. Apr. 1
Simbroco Stone Co. (pfd.)	Dec. 12	.....	.....	.....	$2 Jan. 1
Tidewater Portland Cement Co. (common) (3)	Nov. 25	.....	8½	.....	
Vermont Milling Products Co. (slate granules) 5 sh. pfd. and 1 sh. com. (2)	Dec. 30	.....	$1 for the lot	.....	
Winchester rick Co. (preferred) (sand lime brick) (5)	Dec. 16	.....	10c	.....	

(g) Neidecker and Co., Ltd., London, England. (1) Price obtained at auction by Adrian H. Muller & Sons, New York. (2) Price obtained at auction by R. L. Day and Co., Boston. (3) Price obtained at auction by Weilepp-Bruton and Co., Baltimore, Md. (4) Price obtained at auction by Barnes and Lofland, Philadelphia, Pa. (5) Price obtained at auction for lot of 50 shares by R. L. Day and Co., Boston, Mass. (x) Price obtained at auction by Barnes and Lofland, Philadelphia, on November 3, 1925.

Canada Cement Company Annual Report

THE annual financial statement of Canada Cement Co., Ltd., Montreal, Que., for the year ended December 31, 1925, reveals no very striking changes from its predecessors of the past few years. Income after depreciation is shown at the highest figure since 1921, being about $140,000 higher than in 1924.

A comparative statement for 1925 and three years previous is as follows:

Calendar years—	1925	1924	1923	1922
*Income from operations	$2,344,006	$2,205,590	$2,235,439	$2,403,101
Bond interest	307,459	326,190	343,592	360,250
Fire insurance transferred to reserve account	150,570	.....	40,455	148,732
Contingent reserve	200,000	210,000	190,000	275,000
Renewals, etc., reserve	40,000	40,000	40,000	35,000
Reserve for industrial accidents	11,000	23,500	24,000	.....
Preferred dividends (7%)	735,000	735,000	735,000	735,000
Common dividends (6%)	810,000	810,000	810,000	810,000
Balance, surplus	$89,976	$60,900	$52,392	$39,118

*Profits from operations (and other income) after making provision for depreciation.

The president, F. P. Jones, in his remarks to shareholders, says, in part:

"The total consumption of cement in Canada in 1925 was 3% less than it was in 1924, and does not exceed 80% of pre-war consumption. Export business, however, showed a very gratifying increase, enabling your mills to operate approximately 50% of their capacity.

The sales tax, which of necessity must multiply before it reaches the consumer, is very detrimental to new construction; we trust that conditions in the near future will permit the abolishment of this tax.

There is no question but that Canada's purchasing power in 1926 will be considerably greater than it has been for some years, due to good crops, the prices received for same, and the large increase in Canada's export business. This increased purchasing power and the hoped-for abolishment of the sales tax should result in an increased demand for your product.

The policy of your company to reduce the price of cement when circumstances permit has been followed and this policy it is our intention to continue.

Your company's income during the past year, derived from sources other than the manufacture and sale of cement, shows a gratifying increase, reaching the sum of $644,762, and there is every prospect of your income from these sources continuing to increase."

Rockland and Rockport Lime Earnings

THE Rockland and Rockport Lime Corp. reports for 1925 net earnings available for dividends of $102,674. After 7% dividends on $1,049,075 1st pref. and 6% on $393,320 2nd pref. stocks outstanding, a balance of $5640 remained for the common, or 67 cents per share on the 8343 (average number outstanding during the year) common shares. After 6% dividends on the common there was a deficit of $44,418.

Dolese and Shepard Net Gains

DOLESE AND SHEPARD CO., Chicago, Ill., last year enjoyed a year of activity owing to the expansion in building operations in Chicago, and net profits after setting aside a reserve of $35,000 for contingencies was $259,088, the equivalent of $13.53 a share on the present issue of stock. This compares with a net profit of $180,873 in 1924. Balance sheet as of December 31 last compares with 1924 as follows:

ASSETS

	1925	1924
Cash	$ 162,753	$ 193,097
Customers' notes rec.	54,675	39,917
Customers' accts. rec.	84,691	64,972
Inventories	44,098	65,307
Prepaid expenses	3,610	4,825
Total current assets	$ 349,830	$ 368,120
Municipal imp. bonds	.....	14,786
Plant equipment	1,040,255	1,024,710
Less res. for dep.	562,297	572,823
Net plant, equip.	$ 477,957	$ 451,886
Real estate quarries, net	670,719	701,958
Total	$1,498,507	$1,536,752

LIABILITIES

Accounts payable	$ 19,500	$ 24,436
Div. declared unpaid	28,803	.....
Bond interest accrued	2,550	6,105
Local taxes accrued	9,687	10,496
Reserve for contingencies	35,000	.....
Total	$ 95,591	$ 41,037
6% bonds due April 1, '30	.....	$ 407,000
Called for pay. Apr. 1, '26	170,000	.....
Current liab.	$ 265,591	.....
Capital stock	957,400	1,914,800
Surplus	275.515	*826,085
Net worth	$1,232,915	$1,088,714
Total	$1,498,507	$1,536,752

*Deficit.

In his annual report to stockholders President J. F. Talbot said: "We produced 738,713 yd. of stone, a gain of 13% over the previous year. Our shipments were 844,568 yd., a gain of 28%. We sold 124,611 yd. of screenings to the farmers for fertilizing the soil, which contributed a large percentage to our increase. We received at the Hawthorne quarry hole 54,708 truck loads and 1912 carloads of refuse, bringing us a revenue of $81,930.24. On December 31, 1924, we had $407,000 outstanding bonds. At the close of 1925 the number was reduced to $170,000 and these by a vote of the directors on December 16, 1925, were ordered cancelled on the next interest date, April 1, 1926. Since December 31 we have purchased and cancelled $65,000 of the above number, leaving only $105,000 to be cared for on the cancellation date. This will leave the capital stock of the company its only fixed liability.

"Since 1908 the company has paid no dividends, but in 1925 we paid, including the January 1, 1926, distribution, $114,888. Our plant at Gary, Ill., has been kept intact, by replacements, and is up to its standard of efficiency. There were no bad debt losses during the two years 1924 and 1925 and all accounts receivable are considered good and collectible. Prospects for 1926 for building construction and road improvements are such that a successful year seems to be assured."
—*The Economist.*

New England Lime Earnings

THE following figures show the earnings of the New England Lime Co. for the last half of 1925, ending November 30:

INCOME ACCOUNT FOR FIVE MONTHS ENDED NOVEMBER 30, 1925

Gross income		$214,155
Interest on bonds		33,750
Deprec. & Depl.	$46,454	
Bond discount	5,625	
		52,079
Less: Dividends on preferred stock		29,167
Balance to surplus		$99,159

Note—The fiscal year has been changed to end November 30.

Acme Cement Tenders

THE Empire Trust Co., trustee, 120 Broadway, New York City, will receive bids for the sale to it of 6% first mortgage gold bonds, dated August 20, 1915 of the Acme Cement Corp., to an amount sufficient to absorb $13,665, at a price not to exceed 100 and interest.

Cement Products

TRADE MARK REGISTERED WITH U. S. PATENT OFFICE

Cement Products Industry in Florida

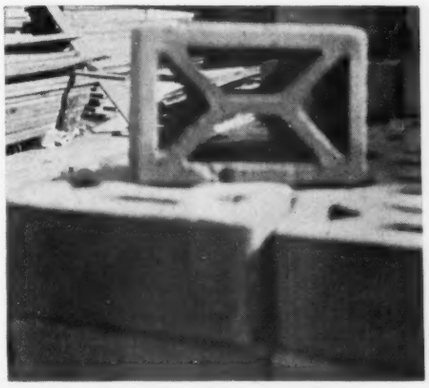
Good Demand for Building Purposes Keeps Plants Busy—Pre-cast Units Are Distinctive and Unusual

By Edmund Shaw
Editor, Rock Products

ACCORDING to a source which should have the correct information, there are 234 cement products plants in Florida, and all of them are busy. Naturally, only a few of these were visited during a recent visit of the writer to the state, so what is said here may not apply to all sections of the state or to all the plants. The largest plant visited (said to be one of the largest in the state) the Florida Nu-Tex Co. had ten power driven building tile machines at work, the smallest had two hand machines operated by women. It is claimed that even the smallest of the plants are making money, as the demand for building material of all kinds is so strong and because concrete is a preferred material. In some cases concrete tile have sold at a considerably higher price than other materials for the same purpose, simply because of this preference for concrete.

Hollow Tile in Favor

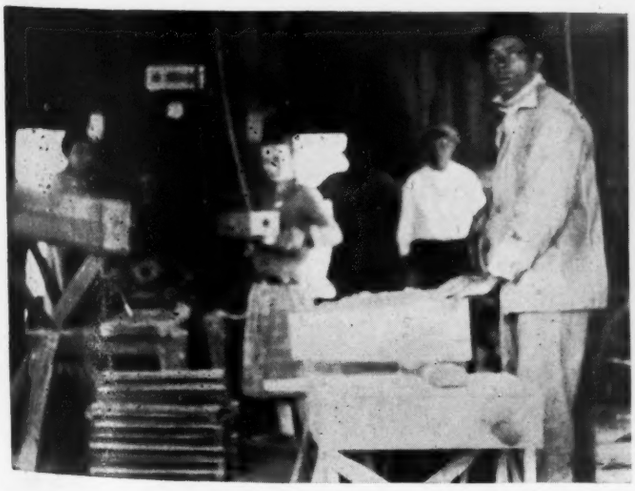
The standard 8x8x16 blocks are considerably made in Florida, but the writer saw only one plant making them. At all the other plants some form of tile was being made. Competent authorities assured me, from their own extensive observations of construction work in progress throughout the state, that hollow tile are decidedly in favor. The reason for this seems to be that the tile are preferred by the masons, who lay them, because they are lighter and much easier to handle than the standard blocks. Of course the cost is somewhat higher for equal footage.



One of the types of hollow cement tile popular in Florida construction

High Quality of Tile Makes Prestige

Of the various forms of tile that were noted, more Anchor "Hi-Test" tiles were seen than any other. The Duntile, however, is very considerably made. It was reported that there are 37 Duntile plants in the state employing 59 machines. One reason for the popularity of this tile is its prestige. A tile maker who was changing over to this tile from another form said that he did so because the company leasing the machines watched the output and would cancel the lease if good tile were not made. The fact



Making short concrete posts or bases for houses

Concrete bases for frame houses curing in the yard

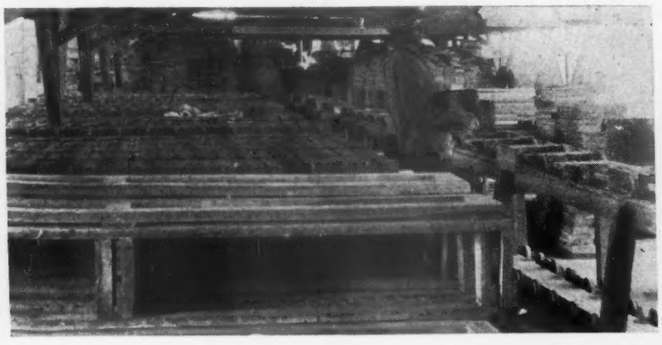
that this was done had given this form of tile a good reputation.

Stonetile is another of the "patented" forms that is coming in strong. It was estimated that 15 to 20 plants were already in operation and more were shortly to be built. This form of tile is a poured unit and it originated in Los Angeles where it holds a strong position in the building unit market. It was described, as made in Los Angeles, in Rock Products for December 12, 1926. It can be made in any climate, of course, but it is especially adapted to climates in which there is little or no freezing weather, as the blocks are molded on sand beds and left there to set sufficiently to be handled, and this requires a large area. In California the beds have no covering; in Florida they are covered with a light roof to keep off heavy rains so the men can work.

But the tile mostly noted, as stated, was the Anchor tile, and in all the plants visited but one, tile of excellent quality were being made. And in this plant the making of poor block was only a temporary affair which the owner quickly remedied by firing everyone on the job, taking matters in his own hands and breaking up the poor blocks left in the yard. Competition is keen enough, in spite of the demand, to insure a good product. Builders, even though they were in a hurry, would not buy a poorly made block, at least in any of the localities that were visited.

Good Blocks Made Despite Inferior Aggregate

This is rather surprising because many of the blocks are made of inferior aggregate. Inferior aggregate, of course, means that more cement must be used to make a block that will stand up, and hence there is every temptation to save money by using too little cement. But no evidence that this was being done was noted. At one plant where very fine sand was the only aggregate used (or



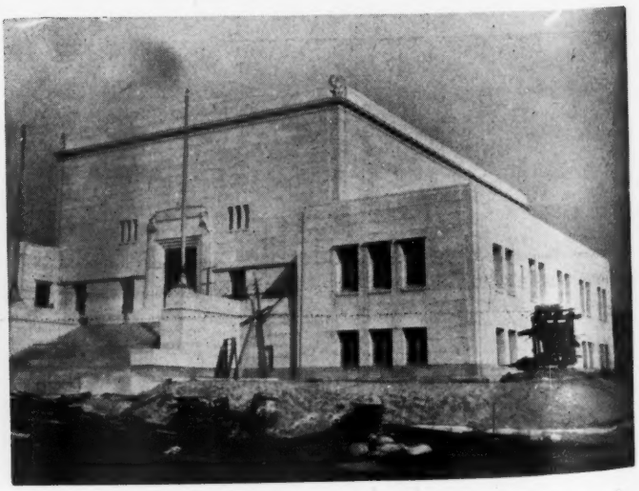
Conveyor belt carrying cement block to curing sheds

Typical covered curing sheds in Florida

Some of the cast trim stone designs used in Florida

Pre-cast units which enter largely into construction

One of the beautiful buildings made with cement products in a Florida city



New Scottish Rites Temple at Jacksonville, built entirely of artificial stone

A design cut into artificial stone made with Ocala limestone as aggregate

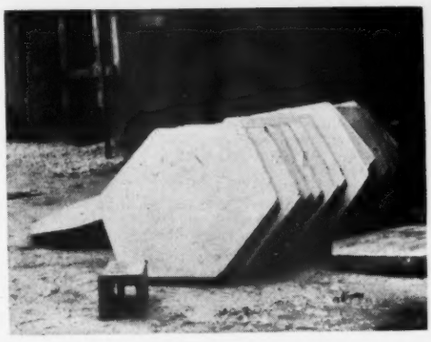
Carving ornamental art objects from artificial stone

obtainable) the mix was 1 to 3. The resultant concrete was good enough so far as it could be judged without actually putting in a testing machine. At another plant a mixture of fine sand and oyster shells was used as aggregate and a 1 to 5 mix was used. It seemed to be pretty fair concrete. Of course the users of such aggregate know that it is inferior and buy better material when they can get it. Crushed granite (screenings) from Columbia, N. C., Birmingham slag and sand and fine gravel from west Florida are all used, but the output of these materials is only a small part of what the 234 plants in operation would consume. Crushed soft limestone, especially Ojus stone, coquina, and other shell rock, crushed field stone, oyster shells, beach shells and beach sand are some of the unusual aggregates used in block making and whatever they lack in quality is made up by using enough extra cement to cover the difference.

Artificial Stone Using Ocala Limestone for Aggregate

The most unusual aggregate used in cement products is the soft Ocala limestone. This is almost as soft as chalk; that is, a fair sized piece may be broken in the fingers. But when it is used in a mix of 1 to 2½ or 1 to 3 it makes a harder concrete than one would believe possible. It is prepared by being broken in a hammer mill to about ⅜-in. size (of course the greater part of it is reduced to a much finer mesh) and ground at the plant to ⅛-in. and finer.

The result is an artificial stone that cuts easily and is worked into ashlars for building and for trim stone. Ornamental work is carved from it, including the most delicate tracery. It sells at nearly the price of cut limestone, the familiar building material in many northern cities, and many architects in Florida use it in preference to the natural stone because they say it can be used with a somewhat greater freedom of design. The new Scottish Rites temple in Jacksonville is faced with this artificial stone and the designs were cut after the stone was in place by the Jacksonville Concrete Co. which made the stone. The Arnold Stone Brick and Tile Co. is another concern which makes a great deal of this stone, and its product has been used in some of the handsomest buildings in the state—which means a good deal when one considers the quality of the structures that are being erected there today.



Pre-cast octagonal paving blocks used in sidewalks in Southern cities

Precast Units of Unusual Design

Certain precast units which are hardly known elsewhere are used to a very large extent and are regular products with many plants, large and small. These are the short concrete posts and bases on which frame houses are placed. It is usual to raise such houses about 2 ft. from the ground to insure dryness and prevent the timbers from rotting. Another unit quite out of fashion in northern cities but very much used through the south is the octagonal paving block or tile used in sidewalks. They can be used in Florida without fear of being thrown out of the ground by frost and their appearance is apparently preferred to that of the plain walk. Many plants make them. No concrete pipe plants were visited, but the pipe business is extensive as it would necessarily be where drainage is so important.

Cast trim stone and ornamental work is used profusely in Florida and some very skillful modelers are employed by the larger companies which make them. The Jacksonville Concrete Co. turns out some excellent pieces and the Anchor Co. of Tampa is a concern which specializes on this kind of work. The regular glue molds are used and it is a matter of no small skill to fill these molds and tamp the concrete so that every detail shall be cast sharp and clean. At the Anchor plant some beautiful figures were being cast, some of them on a rather large scale.

High Standard of Cement Products Throughout Florida

It would be the writer's judgment after visiting a great many cement products plants in practically all parts of the United States that the cement products business has set a high standard for itself in Florida. Certainly concrete masonry has done so. The beautiful houses of Coral Gables and other new places have been photographed many times and their pictures have been published so often that they are familiar to everyone. As in California, the cement block has been found perfectly adapted to the Spanish architecture which is being almost universally adapted in the southern states. It is almost an ideal material for holding the stucco surface and it has the massiveness and solidity that the Spanish architecture demands to make it effective. Moreover, it is the material that will give these effects at the lowest cost.

R. S. Taggart Appointed District Engineer of Portland Cement Association

THE Portland Cement Association, Chicago, Ill., announces the appointment of R. S. Taggart as district engineer in charge of the Pittsburgh office, Farmers Bank building. This office has charge of association work in western Pennsylvania.

Mr. Taggart has been connected with the Portland Cement Association since June, 1921, having served as field engineer in Ohio

Traffic and Transportation

EDWIN BROOKER, Consulting Transportation and Traffic Expert
Munsey Building, Washington, D. C.

Proposed Changes in Rates

THE following are the latest proposed changes in freight rates up to the week beginning March 17:

New England Freight Association Docket

9781. **Feldspar, flint rock and quartz** rock, crude or ground. Minimum weight 50,000 lb., from Cardigan, Cold River, Keene, South Lyneboro, Burleyville, Mathews, Ossipee, Rumney and Swainboro, N. H., to Cumberland, Md., 24½ cents via B. & M.-D. & H. Co.-Penn. R. R. Reason: To equalize competitive routes.

6791. **Molding sand.** Minimum weight 90% of marked capacity of the car, except when car is loaded to cubical or visible capacity, actual weight will apply, from B. & M. R. R. stations in New York state to Holyoke, Mass., 14½ cents (to include switching charges of N. Y., N. H. & H. R. R. at Holyoke, Mass., not to exceed 38 cents per net ton). Reason: To meet rate published from New Hamburg and Cohoes on the N. Y. C. to Holyoke for N. Y., N. H. & H. R. R. delivery.

9794. To establish **rates on limestone, crude,** crushed or ground (in packages). Minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, except that the minimum weight on ground limestone will be 50,000 lb. from points on Rutland R. R. named in Agent Frank Van Ummersen's I. C. C. 45 taking St. Alban's rate group to destinations named in this tariff, based on current all rail rate New York to Chicago of 30 cents, with usual differentials under standard all rail rates to arrive at St. Alban's rates which apply from Rutland R. R. Reason: Producers on Rutland R. R. desire benefit of rail and lake rates this coming season.

9813 (2R)—**Asbestos refuse and asbestos shorts** (applies only on material testing 0-0-5-11 or lower and so certified on bill of lading), **minimum weight** 60,000 lb., from Hyde Park, Vt., and Sherbrooke, Que., to Ivy Hill, Pa., 26½ cents. Reason—To place Ivy Hill, Pa., on a parity with other points in Trunk Line territory.

9838 (2-R)—**Marble dust,** from Falls Village, Conn., to New Brighton, N. Y., 19. Reason—To permit of a rail movement on this traffic.

Southern Freight Association Docket

25491. **Stone,** artificial: (a) Building blocks, plain faced, not in imitation of chiseled, dressed, hammered or sand rubbed natural stone; loose or in packages. Carloads, minimum weight 36,000 lb.

(b) Blocks, pieces or slabs, N. O. I. B. N., molded in imitation of carved, lettered or traced natural stone, packed in excelsior, hay, straw or similar packing material or in packages. Carloads, minimum weight 36,000 lb.

(c) Blocks, pieces or slabs, N. O. I. B. N., molded in imitation of chiseled, dressed, hammered or sand rubbed natural stone, loose or in packages. Carloads, minimum weight 36,000 lb.

Blocks, pieces or slabs, N. O. I. B. N., in slabs, in boxes or crates, in blocks or pieces or with finished surface protection by boxing or crating securely strapped to each piece. Carloads, minimum weight 36,000 lb.; from Richmond, Va., to Talladega, Ala. Class rates now apply. Proposed: Description (a) 35 cents, description (b) 37 cents, description (c) 39½ cents per 100 lb. The proposed rates are based on the proposed Georgia mileage scale reduced 10%.

25498. **Stone,** rough or sawed. Carloads, minimum weight 30,000 lb., from Bowling Green, Ky., to Newton Falls, Ohio. At present Cincinnati combination rate applies. Proposed, 25½ cents per 100 lb., same as rate in effect to Youngstown, Ohio.

25506. **Sand and gravel.** Carloads, minimum weight stenciled capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Montgomery, Ala., to Yulee and Fernandina, Fla. Present rates: To Yulee, $2.03; to Fernandina, $2.10 per net ton. Proposed rate to both points, $1.94 per net ton, made on basis of the proposed Georgia scale, less 10%.

25509. **Sand.** It is proposed to cancel present commodity rates on sand, carloads, from E. T. & W. N. C. stations, viz.: Elizabethton, Sycamore, Shoals, Hampton, Valley Forge and Smalling Tenn., to various stations on the C. C. & O. Ry., account of no movement. Lowest combination to apply after cancellation.

25522. **Feldspar.** Carloads, minimum weight 50,000 lb., from Bristol, Va., to Blackwell, Sapulpa, Okla., Fort Smith, Ark., Dallas, Fort Worth and Wichita Falls, Texas. Fifth class rates now apply. Proposed, $8 per net ton, same as rate proposed in Submittal No. 23862 from Erwin, Tenn.

25525. **Crushed stone,** carload, from Whitestone, Ga., and **crushed marble,** carloads, from Tate, Ga., Brownson, Ala., Emauhee, Ala., and Gantt's Quarry, Ala., to Gypsum, Ohio. Lowest combination now applies. Proposed: Same as existing rates from the same origins to Sandusky, Ohio.

25571. **Gypsum.** Carloads, minimum weight 60,000 lb., from Saltville, Va., to Sylva and Dillsboro, N. C. Lowest combination now applies. Proposed, 16 cents per 100 lb.

25593. **Calcite.** It is proposed to establish through rates on calcite (ground or pulverized limestone or marble), carloads, minimum weight marked capacity of car, except when car is loaded to full visible capacity, actual weight will apply, from Cartersville, Ga., and Sparta, Tenn., to Little Rock, Ark., in lieu of present class or combination rates. The proposed rates of $4.53 per net ton from Cartersville and 37 cents from Sparta represent the present Memphis, Tenn., combination.

25595. **Stone and marble,** broken or crushed. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Whitestone $1, from Tate $1.20. Class A rates now apply. Proposed: From Whitestone, $1; from Tate, $1.20 per net ton, made in line with rates in effect from and to other points on the L. & N. R. R. for similar distances.

25622. **Granite and stone,** taking same descriptions and carloads, minimum weight as applicable to Cambridge, Miss., from **quarries located on** Southern Ry., from which rates are published in Stone Tariff 4, I. C. C. A-9979 (So. Ry.), to Cambridge, Miss., to Braham, Miss. Combination rates now apply. Proposed: Same as published on granite and stone to Cambridge, Miss., in tariff **mentioned above.**

25624. **Granite or stone,** crushed or rubble. Carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to visible capacity, actual weight will govern, from Parkhill, S. C., to stations on Ga. & Fla. Ry. between Augusta, Ga., and Wrens, Ga., including Wrens, Ga. Combination rates now apply. Proposed rates ranging from 99 cents to Noco, Ga., up to $1.04 to Gracewood, Ga., $1.08 to Melton, $1.13 to Bath, $1.17 to Keysville, Ga., and $1.17 per net ton to Wrens, Ga. The proposed rates are based on the proposed Georgia joint line scale, less **10%.**

25645. **Stone.** It is proposed to cancel the present commodity rate of 6½ cents per 100 lb. on rough quarried stone, carloads, from Anniston and Birmingham, Ala., to Gantt's Quarry, Ala., as published in L. & N. R. R. individual tariffs, account of no movement. Class rates to apply after cancellation.

25687. **Limestone,** asphaltic, broken or crushed (not ground or pulverized). Carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full visible capacity, actual weight will govern, from Colrock and Margerum, Ala., to Tennessee points named below. In lieu of lowest combination, it is proposed to establish the following rates: To Pulaski, Tenn., $1.85; to Bufords, Pleasant Grove and Glendale, Tenn., $1.93; to Nashville, Tenn., $2.03 per net ton. The proposed rates are made on practically the same basis as observed in connections with rates recently authorized from the origins named to stations on the I. C. and Y. & M. V. R. R.'s.

25696. **Sand and gravel,** straight or mixed carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Collong, Kenneth and Dillon, S. C., to stations on the Virginia & Carolina Southern R. R. Lowest combination now applies and it is proposed to establish rates based generally speaking on the carriers' proposed Georgia scale for joint line distances applied over trunk and short lines, less 10%. As representative, proposed rates from Collong, S. C., to Roslin, N. C., $1.36; Powers, N. C., $1.42, and Elizabethtown, N. C., $1.52 per net ton.

25708 (shippers; rates suggested by carriers)—**Granite and stone,** crushed and screenings, carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their full capacity actual weight will govern, from Kincaid, Tenn., to Carolina points named below. In lieu of combination rates it is proposed to establish rates as follows: To Asheville, N. C., 134; Charlotte, N. C., 162; Hendersonville, N. C., 143; Hickory, N. C., 152; Marion, N. C., 143; Statesville, N. C., 161; Greenville, S. C., 161; Spartanburg, S. C., 152 cents per net ton; made on the same basis as observed in establishing rates from Hollams, S. C.

25712—**Sand and gravel,** carloads, minimum weight stenciled capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Montgomery, Ala., to O. C. L. R. R. stations, Hickox, Ga., to Pickett, Fla., inclusive. It is proposed to establish reduced rates as follows: To stations Hickox to Hilliard, Fla., inclusive, 180; to stations, Dyal to Cary, Fla., inclusive, 185; to Dinsmore and Pickett, Fla., 189 cents per net ton. Proposed rates are based on the carriers proposed single line scale for application in the State of Georgia, less 10%.

25725—**Cement.** It is proposed to establish specific rates on cement, carloads, usual description, from Clinchfield, Ga., to N. C. & St. L. Ry. stations between Atlanta and Chattanooga, including Rome Division branch, on basis of Fourth Section Committee of Southern Carriers' scale, observing present rates to Rome, Ga., Dalton, Ga., and Chattanooga, Tenn., as maximum. Statement of present and proposed rates will be furnished upon request.

25759 (shipper; rates suggested by carrier)—**Stone, crushed,** carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity actual weight will govern, from Samlaw, S. C., to Bee Gee, Powers and Roziers, N. C. Combination applies. Proposed: To Bee Gee and Powers, 152; to Roziers, 158 cents per net ton, made on basis of the proposed Georgia scale, less 10%, for application between trunk lines and short lines.

25768 (shippers; rates suggested by carriers)—**Sand and gravel,** carloads, as per Description No. 56, Agt. Glenn's I. C. C. A494, from Montgomery, Ala., to Wrens and Zebina, Ga. Combination on Camak, Ga., now applies. Proposed: To Wrens, 180; to Zebina, 185 cents per net ton; based on the carriers' proposed joint haul scale for trunk line application.

25781 (shipper; rates suggested by carrier)—**Sand and gravel.** It is proposed to establish a commodity rate of 104 cents per net ton on sand and gravel, carloads, minimum weight 90% of the marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Cincinnati, O., Newport, Ky., and Covington, Ky., to Lexington, Ky., Paris, Ky., and stations on the Paris and Lexington Branch, in lieu of present commodity rate of 125 cents per net ton. The proposed rate is the same as rate now in effect from Louisville to Lexington, Ky.

25785 (shippers)—**Rock bituminous asphalt** (ground or in blocks), carloads, as described in I. C. R. R. I. C. C. 6928, from Big Clifty, Rockport and Summit, Ky., to Montgomery, Madison and Kilby, Ala. It is proposed to establish reduced rates, as follows: To Montgomery, 320 cents; Madison, 390 cents; Kilby, 455 cents per net ton, based 50 cents per ton over rates in effect from Bowling Green, Ky.

25786 (shippers)—**Rock asphalt,** as described in I. C. R. R. Trf. 2316 series, from Big Clifty, Rockport and Summit, Ky., to Kansas City So. Ry. stations between Texarkana, Ark., and Shreveport, La. No through rates in effect. Proposed, 508 cents per net ton, based to Shreveport, La., 400 cents per ton, plus proportion of 108 cents per ton beyond.

25811—**Phosphate rock,** carloads, subject to present description and carload minimum weight from points of origin in the state of Florida named in Note 1, page 2, of A. C. L. R. R. I. C. C. B2334, Phosphate Rock Tariff No. 4, and in Note 7, page 3, of S. A. L. Ry. I. C. C. A7114, Phosphate Rock Tariff No. 6, to Roanoke, Ala. Present rate, 439 cents; proposed, 462 cents per ton of 2240 lb., same as rate formerly in effect, and is also the same as rate in effect to Anniston, Talladega, Ala., Carrollton, Rome and Dalton, Ga., and other points north of the Atlanta-Newnan-LaGrange line.

25812 (shippers; rates suggested by carriers)—Sand (except glass and moulding sand) and gravel (washed or unwashed), carloads, minimum weight 90% of marked capacity of car, except when cars are loaded to their visible capacity, actual weight will govern, from Paywill, N. C., to Lancaster, Kershaw and Clinton, S. C. Present and proposed rates are:

To—	In cents per net ton Present	Proposed
Lancaster, S. C.	165	176
Kershaw, S. C.	165	167
Clinton, S. C.	175	176

The proposed rates are made on basis of scale submitted by carriers to the Georgia Public Service Commission for joint line distance, less 10%, and is the scale generally applied in the publication of rates between points in Carolina territory.

25815 (shipper; rates suggested by carrier)—(a) **Gypsum**, carloads, minimum weight 60,000 lb. (see Note 7 of N. & W. I. C. C. 7693); (b) gypsum rock, crushed gypsum rock and ground gypsum rock, carloads, minimum weight 60,000 lb.; from (a) Plasterco and Saltville, Va.; (b) Darrow, Gladys, Ideal and Southard, Okla., to Phoenixville (old name Powderly, Ala.), Ala. Class or combination rates now apply. Proposed: From Plasterco and Saltville, Va., 16 cents; from Darrow, Gladys, Ideal and Southrad, Okla., 24 cents per 100 lb. Proposed rates, same as in effect to Birmingham, Ala., and other points in the Birmingham group.

Western Trunk Line Docket

5190. **Sand.** Carloads, from Eau Claire, Wis., to Cincinnati, Ohio. Rates: Present, $4.25 per ton of 2000 lb.; proposed, $3.92 per ton of 2,000 lb. Minimum weight 90% of marked capacity of car, but not less than 40,000 lb.

5205. **Stone, broken, crushed or ground.** Carloads, from Sharp, Mo., to Leavenworth, Kan. Present, 85 cents per ton; proposed, 80 cents per ton. Minimum weight marked capacity of car, but not less than 50,000 lb.

3845-B. **Stone,** as described in Item 1921 W. T. L. Tariff 13-N, I. C. C. A-1603, from Osage, Iowa, to Chaska, Minn. Present, 7 cents per 100 lb.; proposed, $1.25 per ton.

Illinois Freight Association Docket

2588. **Stone,** crushed. Carloads, minimum weight 90% of marked capacity of car. Rates in cents per net ton: From East St. Louis, Ill., to Cedar Rapids, Iowa. Present, 270 cents; proposed, 240. From Evansville, Ind., to Cedar Rapids, Iowa. Present, 460; proposed, 318 (when originating at points in Southeastern and Carolina territories).

2318-A. **Sand and gravel.** Carloads, minimum weight 90% of marked capacity of car, but not less than 40,000 lb., from Metropolis, Ill., to Tamas, Ill. Present, Class "E;" proposed, 85 cents per net ton.

2585-G. **Molding sand.** Carloads, minimum weight 90% of marked capacity of car, from Wilmington, Ill., to Hannibal, Mo. Rates in cents per net ton: Present, class rates; proposed, 177.

3175-A. **Sand.** Carloads, minimum weight 90% of marked capacity of car, but not less than 72,000 lb., from Ottawa-Utica district to Chester, Penn. Rates in cents per net ton: Present, 643; proposed, 500.

3537. **Sand,** viz.: Blast, engine, foundry, glass, loam, marl, molding and silica. Carloads, minimum weight 90% of marked capacity of car, except when car is loaded to full cubical or visible capacity, actual weight will apply, from Greenville, Mulberry Grove and Vandalia, Ill., to Savanna, Ill. Rates in cents per net ton: Present, 202; proposed, 198.

3543. **Sand,** all kinds, except blast, engine, foundry, glass, molding or silica, also **gravel.** Carloads, minimum weight capacity of car, from East St. Louis, Ill. Rates in cents per net ton: To Coulterville, Ill., Pinckneyville, Ill., present, 98; proposed, 94. To Du Quoin, Ill., present, 100; proposed, 98. Carbondale, Ill., Christopher, Ill., Benton, Ill., West Frankfort, Ill., present, 101; proposed, 98. To Johnston City, Ill., present, 113; proposed, 101.

3550. **Crushed stone.** Carloads, minimum weight capacity of car, from Dubuque, Iowa. Rates in cents per net ton: Present, to East Dubuque, Ill., 76; Galena, Ill., 88; Fields, Ill., 101; Scales Mound, Ill., 101; Apple River, Ill., 113; Eleroy, Ill., 151; Freeport, Ill., 151. Proposed: To East Dubuque, Ill., 50; Galena, Ill., 81; Scales Mound, Ill., 88; Apple River, Ill., 88; Eleroy, Ill., 90; Freeport, Ill., 100.

3240-A. **Ground stone.** Carloads, minimum weight 80,000 lb., from Joliet, Ill., to Marseilles, Ill. Present, 8½ cents per 100 lb.; proposed, $1 per net ton.

Trunk Line Association Docket

13113. Sand, other than blast, engine, foundry, molding, glass or silica, carloads, or **gravel,** carloads. (b) Sand, blast, engine, foundry, molding, glass or silica, carloads. Carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Williamsport, Penn., to Tower to Irvonia, Penn., Glen Rock No. 2 to Punxsutawney, Penn. (a) $1.60 and (b) $1.76 per 2000 lb. Reason: To eliminate existing fourth section violations.

Supplement 1 to Rate Proposal 13124—**Cement,** common, hydraulic, natural or portland, carloads, minimum weight 50,000 lb., except when for carriers' convenience cars of less capacity are furnished, in which case minimum weight will be the marked capacity of car furnished, but in no case less than 40,000 lb., from Lehigh District to Forrest Hall, Md., 22 cents per 100 lb. File 38011.

13150 (increase)—**Crushed stone,** carloads, minimum weight 90% of marked capacity of car, except when car is loaded to cubical or visible capacity, actual weight will apply, from Morrisville, Pa., to Harrisburg, Pa., Maclay Street, Harrisburg, Pa., $1.50 and New Cumberland to Lemoyne, Pa., $1.60 per ton.

Reason—To remove Fourth Section departures, also to place all destination points on the proper mileage basis under the so-called "Birdsboro Scale" I. C. C. Dockets 9389 and 9532; P. S. C. Pa. Complaint Docket 1750. File 37994.

Central Freight Association Docket

12712. (2) **Feldspar** and **cornwall stone.** Carloads, East Liverpool, Ohio, to Brazil, Ind. Present rate, 25 and 27½ cents; proposed, $3.33 per net ton.

12713. (1) **Sand,** viz.: Blast, core, engine, filter, fire or furnace, foundry, glass, grinding or polishing, loam, molding and silica. Carloads, to Pittsburgh, Penn., from Phalanx and Geauga Lake, Ohio. Present rate, $1.51 per net ton; proposed, $1.64 per net ton.

12734. (2) **Gravel and sand,** other than blast, engine, foundry, glass, molding or silica. Carloads, Erie, Penn., Ashtabula and Ashtabula Harbor, Ohio., to various points in Pennsylvania.

	From Erie, Pa.	
	Proposed Rate	Present Rate
To—	(Cents per net ton)	
Butler, Penn.	160	205
Bessemer, Pa.	160	175
Carnegie, Pa.	160	175
Clairton, Pa.	160	175
Duquesne, Pa.	160	175
Homestead, Pa.	160	175
McKeesport, Pa.	160	175
Munhall, Pa.	160	175
New Kensington, Pa.	160	18
Pittsburgh, Pa.	160	175
Brackenridge, Pa.	160	18

From Ashtabula and Ashtabula Harbor, O.

	Proposed Rate	Present Rate
To—	(Cents per net ton)	
Butler, Pa.	160	17
Bessemer, Pa.	160	175
Carnegie, Pa.	160	175
Clairton, Pa.	160	175
Duquesne, Pa.	160	175
McKeesport, Pa.	160	175
Munhall, Pa.	160	175
New Kensington, Pa.	160	17
Brackenridge, Pa.	160	17

12735—(2) Crushed stone, carloads, Piqua, O., to Indiana and Ohio points.

To (C. C. C. & St.-L. Ry. Stations)—		Present Per net ton	Proposed
Lynn, Ind.	(1)	13	85
Crete, Ind.	(1)	13	85
Glen Karn, O.	(1)	13	80
Clark, O.	(1)	13	80
Hewitt, O.	(1)	13	80
Springfield, O.	net ton	90	75
Brooks, O.	(1)	13	80
Plattsburg, O.	(1)	13	80
Kays Switch, O.	(1)	13	85
London, O.	net ton	100	85
Versailles, O.	net ton	90	70
Elroy, O.	net ton	90	65
DeGraff, O.	net ton	126	65
Bellefontaine, O.	(1)	11½	75
Franklin, O.	(1)	12	80
Kyles, O.	(1)	13½	85

(1) In cents per 100 lb. (6th class).

Southwestern Freight Bureau Docket

7643 (2)—**Gravel,** from Louisiana points to points in Texas. To establish a rate of $1.40 per net ton on gravel, as described in Item 2700C of S. W. L. Tariff 21R, from Louisiana points named in the item referred to, to Beaumont, Orange and Chaison, Tex. The proposed rate is based on the 9702 scale and considering the low level of the rates between points in Louisiana locally and locally between points in Texas, it is not felt that on the interstate movement the 9702 scale should be exceeded.

7651—(1) **Oyster shells,** from points in Louisiana to interstate points. To establish rate of 46½c per 100 lb. on oyster shells, crushed or ground, or unground or uncrushed, carloads, from Berwick, Houma and Morgan City, La., to Duluth, Minn., and points taking same rates. It is stated that the proposed rate has already been approved for application from New Orleans, La., and points taking same rates, also from Texas Gulf ports, and it is, therefore, felt that the Louisiana producers should be accorded the same rates.

7652—(1) **Cement plaster,** from points in Texas to points in Oklahoma. To establish rate of 19½c per 100 lb. on cement plaster and articles taking same rates as described in S. W. L. Tariff 3F, carloads, minimum weight 40,000 lb., from Acme, Agatite, Hamlin, Plasterco, Plasterco Junction, Pyramid, Raton and Sweetwater, Tex., to Texola and Erick, Okla. Shippers located at Hamlin, Plasterco, Plasterco Junction, Pyramid, Rotan and Sweetwater have requested that the same rate as now applicable from Acme and Agatite to Erick and Texola, Okla., be established from Hamlin, Plasterco, Plasterco Junction, Pyramid, Rotan and Sweetwater, Tex., in order that they be placed on a parity with their competitors located at Acme, Tex., and Agatite, Tex.

7668 (2)—**Crushed flint and slate,** from Norman, Okla., to interstate points. To amend Item 2450-A, S. W. L. Trf. 34-K, applicable on crushed flint, crushed stone, etc., to St. Louis, Mo., East St. Louis, Ill., Kansas City, Mo., and Memphis, Tenn., to include Norman, Ark., at the same rate as now in effect from Caddo Gap and Glenwood, Ark. It is stated that Norman, Ark., is located 5 miles west of Caddo Gap and as there is a contemplated movement from Norman, it is felt there is no reason for not applying the same rates from Norman, Ark., as in effect from Caddo Gap, Ark.

7669 (2)—Slate and flint, from Norman, Ark., to interstate points. To amend Item 2455-A, S. W. L. Trf. 34-K, naming rates on crushed slate, crushed flint, etc., to Chicago, Edwardsville, Marseilles, Vandalia, Ill., and Minneapolis, Minn., by adding Norman, Ark., as a point of origin on the same basis of rates as in effect from Caddo Gap, Ark. It is stated that Norman, Ark., is located 5 miles west of Caddo Gap, and as there is a contemplated movement from Norman, the same rates from Norman, Ark., as in effect from Caddo Gap, Ark.

7671 (1)—**Sand,** from points in Arkansas to points in Oklahoma. To establish the following rates in cents per 100 lb. on sand, carloads, minimum weight 80,000 lb., or if marked capacity of car is less than 80,000 lb., marked capacity of car will govern, from and to points shown below:

	From—	
	Guion, Ark.	Ruddels, Ark.
To—	Rate	Rate
Ada, Okla.	13½	12½
Avant, Okla.	12	12
Blackwell, Okla.	12½	12½
Bristow, Okla.	12	12
Checotah, Okla.	12	12
Dewar, Okla.	12½	12
Henryetta, Okla.	12½	12
Muskogee, Okla.	11	11
Pawhuska, Okla.	12	12
Sand Springs, Okla.	11	11
Sapulpa, Okla.	12	11
Shopton, Okla.	12	12
Tulsa, Okla.	11	11
Oklahoma City, Okla.	12½	----
Bartlesville, Okla.	11	----

—From Calico Rock, Ark.—

To—	Rate
Bartlesville, Okla.	10½

It is contended that there is no justification for continuing higher rates from Arkansas points into Oklahoma, higher than the basis of the 9702 scale.

7686 (1)—**Ground limestone,** from Carthage, Mo., to Cedar Rapids, Ia. To establish rate of 14½ cents per 100 lb. on ground limestone, carloads, minimum weight 90% of marked capacity of car, except when loaded to full visible capacity, actual weigh will govern, but in no case shall the minimum weight be less than 40,000 lb., from Carthage, Mo., to Cedar Rapids, Ia. The distance from Kansas City to Sioux City is 297 miles, while the distance from Kansas City to Cedar Rapids, for one line application is 299 miles and if rate of 14½ cents is the proper basis to Sioux City, shippers feel it should also be the proper basis to Cedar Rapids.

7688 (1)—**Lime,** from Limedale Spur, Ark., to Elizabeth, La. To establish a rate of 25½ cents per 100 lb. on lime, carloads, **minimum weight** 30,000 lb., from Limedale Spur, Ark., to Elizabeth, La. Under the present rate, it is stated that proponent is unable to place any lime at Elizabeth, in competition with lime producers from other points.

7690 (1)—**Silica,** from Rogers, Ark., to interstate points. To establish a rate of 16½ cents per 100 lb. to Memphis, Tenn., 24 cents per 100 lb. to Chicago, 28½ cents per 100 lb. to Minneapolis, Minn., and 24 cents per 100 lb. to Omaha and Lincoln, Neb., on silica, crushed or ground, in bulk, in bags, and silica, flour, in bulk, in bags, straight or mixed carloads, minimum weight 60,000 lb., from Rogers, Ark. Operators of silica plant recently opened at Rogers, Ark., complain that present class rates are prohibitive in marketing their product and have proposed rates based on what is felt to be the maximum that the traffic will bear, and enable them to compete with other producers in Malvern district.

7707 (1)—**Oyster shells,** from Texas and Louisiana points to points in Oklahoma. To establish rate of 45½ cents per 100 lb. from New Orleans, 41½ cents per 100 lb. from Morgan City, La., and 37½c per 100 lb. from Houston, Tex., on shells, oyster, crushed or ground, carloads, minimum weight 50,000 lb., except when capacity of car is less to points on the Elkhart extension of the Santa Fe, Libbey to Felt, Okla., inclusive.

Transcontinental Freight Bureau Docket

6651—**Diatomaceous** earth, carloads. E. B. Request that Tariff 3S (I. C. C. 1154, R. H. Countiss, Agent) be amended to provide the same rates on diatomaceous earth from Winkelman, Ariz., to eastern defined territory as now in effect on fluorspar, manganese ore, manganese ore concentrates and pyrites ore.

Portland Cement Output in February

Stocks of Finished Cement Greatest in History of Industry

FEBRUARY shipments of portland cement showed a decrease of slightly over 3% as compared with February, 1925, according to the Bureau of Mines, Department of Commerce. Production shows a decrease of 524,000 bbl., while stocks of portland cement have never been exceeded and are almost 15% greater than in February, 1925, and about 10% more than at the end of January, 1926. The following tables, prepared by the Division of Mineral Resources and Statistics of the Bureau of Mines, are compiled from reports for February, 1926, received direct from all manufacturing plants except one, for which estimates were necessary on account of lack of returns.

Clinker Stocks

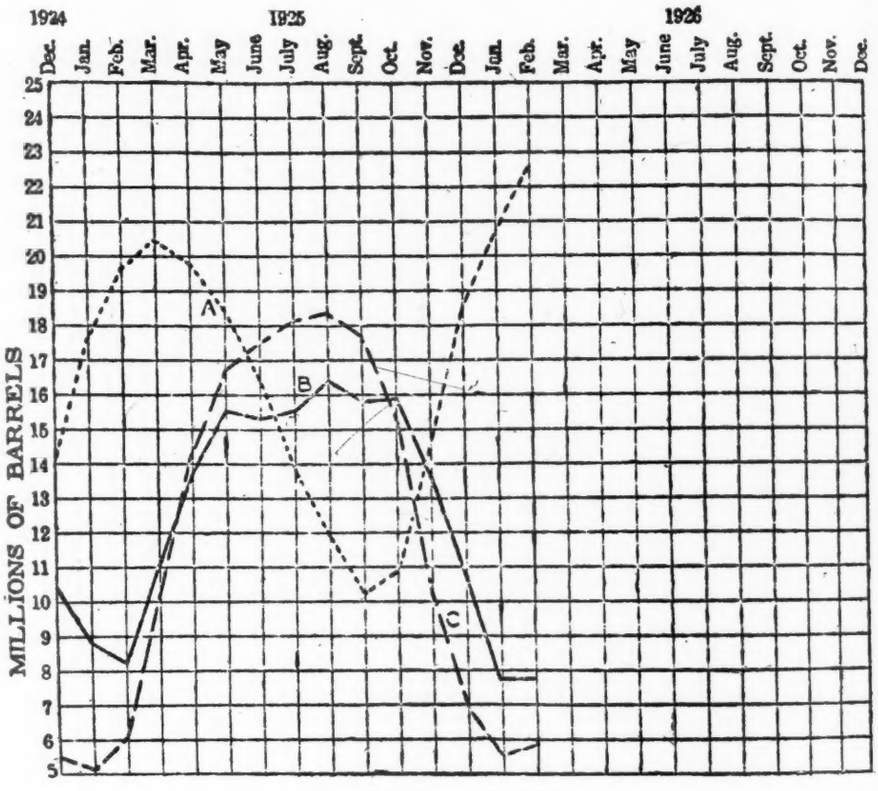
Stocks of clinker, or unground cement, at the mills at the end of February, 1926, amounted to about 10,928,000 bbl. compared with 9,074,000 bbl. (revised) at the beginning of the month.

An estimate of the unground clinker by months is given below. Portland cement consumption by states and per capita for 1924 and 1925 is shown in the last table on the succeeding page and a chart on page 85.

ESTIMATED CLINKER (UNGROUND CEMENT) AT THE MILLS AT END OF EACH MONTH, 1925 AND 1926, IN BARRELS

Month—	1925	1926
January	7,017,000	*9,074,000
February	8,497,000	10,928,000
March	9,962,000	.....
April	9,731,000	.....
May	9,053,000	.....
June	7,937,000	.....
July	6,961,000	.....
August	5,640,000	.....
September	4,561,000	.....
October	4,086,000	.....
November	5,013,000	.....
December	*6,469,000	.....

MONTHLY FLUCTUATIONS IN PRODUCTION, SHIPMENTS, AND STOCKS OF FINISHED PORTLAND CEMENT


1924
1925
1926
Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec. Jan. Feb. Mar. Apr. May June July Aug. Sept. Oct. Nov. Dec.
MILLIONS OF BARRELS
25 24 23 22 21 20 19 18 17 16 15 14 13 12 11 10 9 8 7 6 5
A
B
C

(A) Stocks of finished portland cement at factories; (B) Production of finished portland cement; (C) Shipments of finished portland cement from factories

PORTLAND CEMENT SHIPPED FROM MILLS INTO STATES, IN DECEMBER, 1924 AND 1925, AND JANUARY, 1925 AND 1926, IN BARRELS*

Shipped—	December, 1924	December, 1925	January, 1925	January, 1926
Alabama	121,826	108,906	85,410	129,291
Alaska	173	132	132	165
Arizona	37,459	61,646	34,370	38,869
Arkansas	41,627	43,281	41,376	46,708
California	738,110	938,721	988,883	931,238
Colorado	38,782	30,872	42,425	29,203
Connecticut	59,533	56,260	34,810	40,420
Delaware	7,884	13,680	5,786	8,815
District of Columbia	41,729	57,119	37,285	38,410
Florida	263,031	439,786	265,463	483,824
Georgia	121,333	69,046	93,062	80,129
Hawaii	1,164	20,735	417	10,757
Idaho	6,036	15,993	2,598	19,198
Illinois	328,101	407,808	463,388	323,947
Indiana	121,574	114,856	139,782	85,724
Iowa	31,141	41,325	53,044	28,439
Kansas	62,541	87,368	33,588	56,598
Kentucky	58,064	63,382	52,013	35,560
Louisiana	61,252	74,464	75,992	65,695
Maine	8,053	7,028	4,837	20,310
Maryland	87,137	85,377	47,635	79,497
Massachusetts	140,103	133,365	113,101	101,327
Michigan	178,516	302,889	190,905	222,061
Minnesota	59,101	62,943	59,395	66,063
Mississippi	33,644	34,740	29,867	44,140
Missouri	121,461	207,230	115,141	137,343
Montana	6,923	7,382	5,334	9,716
Nebraska	28,363	34,633	31,832	23,788
Nevada	2,681	4,015	2,492	2,508
New Hampshire	16,176	22,586	9,419	17,081
New Jersey	290,069	329,054	157,612	254,912
New Mexico	6,271	10,258	7,911	33,613
New York	737,623	889,639	400,896	571,447
North Carolina	126,363	152,699	79,817	81,764
North Dakota	132	2,474	1,380	3,338
Ohio	221,142	339,030	259,628	220,728
Oklahoma	118,645	148,354	58,872	101,087
Oregon	43,844	46,531	54,117	53,995
Pennsylvania	436,794	597,328	288,916	426,140
Porto Rico	0	0	0	0
Rhode Island	23,818	26,721	15,668	18,694
South Carolina	47,310	54,545	46,840	44,723
South Dakota	3,627	6,379	4,331	6,413
Tennessee	71,319	80,322	69,669	66,379
Texas	236,875	284,061	260,540	270,231
Utah	6,316	21,135	3,794	10,655
Vermont	4,557	4,066	3,129	2,218
Virginia	73,039	72,698	54,455	61,645
Washington	49,976	82,364	85,969	72,393
West Virginia	47,324	63,066	45,912	39,983
Wisconsin	55,172	77,100	113,396	60,400
Wyoming	9,513	7,968	3,492	5,797
Unspecified	7,203	8,140	15,964	17,162
	5,440,450	6,851,500	5,092,090	5,600,541
Foreign countries	65,550	65,500	69,910	71,459
Total shipped from cement plants	5,506,000	6,917,000†	5,162,000..	5,672,000

*Includes estimated distribution of shipments from three plants each month. †Revised.

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY MONTHS, IN 1925 AND 1926, IN BARRELS

Month	Production 1925	Production 1926	Shipments 1925	Shipments 1926	Stocks at end of month 1925	Stocks at end of month 1926
January	8,856,000	*7,887,000	5,162,000	*5,672,000	17,656,000	*20,582,000
February	8,255,000	7,731,000	6,015,000	5,820,000	19,689,000	22,493,000
March	11,034,000	.....	10,279,000	.....	20,469,000	.....
First quarter	28,145,000	.....	21,456,000	.....	.....	.....
April	13,807,000	.....	14,394,000	.....	19,877,000	.....
May	15,503,000	.....	16,735,000	.....	18,440,000	.....
June	15,387,000	.....	17,501,000	.....	16,409,000	.....
Second quarter	44,697,000	.....	48,630,000	.....	.....	.....
July	15,641,000	.....	18,131,000	.....	13,896,000	.....
August	16,419,000	.....	18,383,000	.....	11,952,000	.....
September	15,939,000	.....	17,711,000	.....	10,247,000	.....
Third quarter	47,999,000	.....	54,225,000	.....	.....	.....
October	15,992,000	.....	15,309,000	.....	10,979,000	.....
November	13,656,000	.....	10,187,000	.....	14,534,000	.....
December	*10,713,000	.....	*6,917,000	.....	*18,365,000	.....
Fourth quarter	40,361,000	.....	32,413,000	.....	.....	.....
	161,202,000	.....	156,724,000	.....	.....	.....

*Revised

PRODUCTION, SHIPMENTS AND STOCKS OF FINISHED PORTLAND CEMENT, BY DISTRICTS, IN FEBRUARY, 1925 AND 1926, AND STOCKS IN JANUARY, 1926, IN BARRELS

Commercial district—	Producton—February, 1925	Producton—February, 1926	Shipments—February, 1925	Shipments—February, 1926	Stocks at end of February, 1925	Stocks at end of February, 1926	Stocks at end of January, 1926
E'n Penn., N. J. & Md.	2,486,000	2,447,000	1,490,000	1,137,000	4,746,000	5,115,000	3,805,000
New York	272,000	288,000	206,000	145,000	1,233,000	1,590,000	1,447,000
Ohio, W'n Penn. & W. Va.	593,000	739,000	404,000	402,000	1,977,000	2,792,000	2,455,000
Michigan	453,000	288,000	254,000	237,000	1,185,000	2,045,000	1,994,000
Wis., Ill., Ind. & Ky.	1,240,000	775,000	601,000	649,000	3,547,000	3,700,000	*3,574,000
Va., Tenn., Ala. & Ga.	919,000	1,029,000	780,000	937,000	869,000	1,058,000	966,000
E'n Mo., Ia., Minn. & S. Dak.	499,000	483,000	389,000	396,000	3,248,000	3,066,000	*2,979,000
W'n Mo., Neb., Kans. & Okla.	388,000	361,000	468,000	518,000	1,498,000	1,399,000	1,556,000
Texas	339,000	393,000	374,000	400,000	343,000	495,000	502,000
Colo. & Utah	141,000	67,000	110,000	96,000	372,000	244,000	273,000
California	733,000	743,000	786,000	765,000	472,000	511,000	533,000
Ore., Wash. & Mont.	192,000	118,000	153,000	138,000	407,000	478,000	498,000
	8,255,000	7,731,000	6,015,000	5,820,000	19,897,000	22,493,000	*20,581,000

*Revised.

IMPORTS OF HYDRAULIC CEMENT BY COUNTRIES, AND BY DISTRICTS, IN JANUARY, 1926

Imported from	District into which imported	Barrels	Value
Belgium	Florida	101,677	$117,853
	Los Angeles	6,720	7,967
	Massachusetts	17,944	55,629
	Mobile	13,023	19,270
	New Orleans	18,015	29,657
	Oregon	5,987	7,894
	Philadelphia	63,625	108,017
	Rorto Rico	30	159
	San Francisco	5,063	6,676
	Washington	11,957	17,040
	Total	244,041	$370,162
Canada	Buffalo	161	$602
Cuba	Florida	429	$1,424
Denmark and Faroe Islands	Florida	48,958	$93,476
	New York	83	134
	Porto Rico	33,088	53,082
	Total	82,129	$146,692
Japan	Hawaii	494	$863
Norway	Florida	23,460	$40,554
	Massachusetts	8,972	14,404
	Total	32,432	$54,958
Soviet Russia in Europe	New York	894	$2,016
	Grand total	360,580	$576,717

DOMESTIC HYDRAULIC CEMENT SHIPPED TO ALASKA, HAWAII, AND PORTO RICO, IN JANUARY, 1926*

	Barrels	Value
Alaska	311	$984
Hawaii	15,991	34,719
Porto Rico	10,271	25,118
	26,573	$60,821†

*Compiled from records of the Bureau of Foreign and Domestic Commerce and subject to revision.

EXPORTS AND IMPORTS*

EXPORTS OF HYDRAULIC CEMENT BY COUNTRIES, IN JANUARY, 1926

Exported to—	Barrels	Value
Canada	971	$4,720
Central America	10,901	28,840
Cuba	19,012	45,554
Other West Indies	7,867	17,218
Mexico	5,615	18,385
South America	24,478	78,302
Other countries	4,095	23,412
	72,939	$216,431

Consumption

Production plus stocks at the beginning of the year plus imports minus exports and stocks at the end of the year indicates consumption of portland cement in the United States amounting to 147,477,000 bbl. in 1924 and 159,385,000 bbl. in 1925. This was at the rate of 1.32 bbl. and 1.40 bbl. per capita, respectively. The consumption, total and per capita, by states or other subdivisions can be approximated only, because the exchange of cement between states and actual quantities used in each state during a given year are not precisely known. The best available information comprises figures of shipments from mills into the various states, which are given in the following table:

SHIPMENTS OF DOMESTIC CEMENT FROM MILLS INTO STATES AND PER CAPITA, 1924 AND 1925, IN BARRELS

State—	1924 Total	1924 Per capita	1925 Total	1925 Per capita
Alabama	1,872,997	0.76	2,112,979	0.86
Arizona	415,146	1.04	420,871	1.03
Arkansas	1,084,020	0.59	791,684	0.43
California	10,846,703	2.73	12,319,253	3.06
Colorado	1,337,466	1.32	1,146,930	1.13
Connecticut	1,582,312	1.04	1,748,952	1.14
Delaware	385,581	1.65	404,026	1.72
D. of Columbia	722,960	1.47	924,634	1.86
Florida	2,177,233	2.02	4,090,383	3.24
Georgia	1,408,106	0.46	1,412,543	0.46
Idaho	262,422	0.54	258,191	0.52
Illinois	13,328,219	1.93	14,368,880	2.06
Indiana	5,522,818	1.81	4,959,349	1.62
Iowa	3,144,001	1.26	2,677,149	1.07
Kansas	2,142,725	1.18	2,237,056	1.23
Kentucky	1,763,538	0.71	1,787,323	0.72
Louisiana	1,260,231	0.67	1,092,874	0.58
Maine	386,593	0.49	333,443	0.43
Maryland	1,989,182	1.30	2,144,650	1.39
Massachusetts	3,359,553	0.82	3,385,156	0.82
Michigan	9,355,024	2.28	9,594,284	2.32
Minnesota	3,248,369	1.28	3,458,026	1.35
Mississippi	527,046	0.29	580,295	0.32
Missouri	3,985,049	1.15	5,578,569	1.61
Montana	202,782	0.32	236,109	0.37
Nebraska	1,499,998	1.11	1,670,293	1.23
Nevada	91,821	1.19	101,265	1.31
New Hampshire	378,554	0.84	425,307	0.94
New Jersey	6,410,037	1.84	7,047,873	2.01
New Mexico	231,970	0.61	181,536	0.47
New York	17,456,377	1.58	18,334,411	1.64
North Carolina	2,999,559	1.09	3,019,953	1.09
North Dakota	248,732	0.36	341,049	0.49
Ohio	9,262,652	1.48	9,355,883	1.48
Oklahoma	2,210,586	1.00	2,375,647	1.06
Oregon	1,211,462	1.44	1,317,038	1.56
Pennsylvania	12,964,163	1.40	14,814,315	1.59
Rhode Island	608,355	0.96	709,006	1.04
South Carolina	570,631	0.32	861,872	0.48
South Dakota	466,725	0.70	473,856	0.69
Tennessee	1,558,825	0.65	1,633,077	0.67
Texas	3,853,698	0.76	4,181,217	0.82
Utah	427,825	0.88	377,335	0.77
Vermont	300,102	0.85	216,623	0.61
Virginia	1,701,408	0.70	1,644,957	0.67
Washington	1,730,483	1.18	2,462,233	1.67
West Virginia	1,661,042	1.05	1,506,645	0.94
Wisconsin	4,515,256	1.62	4,003,702	1.43
Wyoming	331,309	1.51	223,855	1.01

IMPORTS AND EXPORTS OF HYRAULIC CEMENT, BY MONTHS, IN 1925 AND 1926

Month—	Imports 1925 Barrels	Imports 1925 Value	Imports 1926 Barrels	Imports 1926 Value	Exports 1925 Barrels	Exports 1925 Value	Exports 1926 Barrels	Exports 1926 Value
January	231,258	$364,196	360,580	$576,717	71,596	$207,547	72,939	$216,431
February	119,077	206,308	(†)	(†)	56,249	181,356	(†)	(†)
March	218,048	337,039	.....	.....	65,248	200,410	.....	.....
April	197,686	280,826	.....	.....	89,508	263,831	.....	.....
May	186,897	286,959	.....	.....	85,385	250,845	.....	.....
June	254,937	409,539	.....	.....	71,343	217,899	.....	.....
July	335,118	499,602	.....	.....	98,141	286,543	.....	.....
August	379,847	611,551	.....	.....	103,961	289,904	.....	.....
September	513,252	789,121	.....	.....	102,649	285,225	.....	.....
October	535,050	824,268	.....	.....	73,369	228,467	.....	.....
November	388,604	678,518	.....	.....	101,825	294,201	.....	.....
December	295,543	526,001	.....	.....	100,323	296,900	.....	.....
	3,655,317	$5,813,928	.....	.....	1,019,597	$3,003,128	.....	.....

†Imports and exports in February, 1926, not available.

The Rock Products Market

Wholesale Prices of Crushed Stone

Prices given are per ton, F.O.B., at producing point or nearest shipping point

Crushed Limestone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
EASTERN:						
Buffalo, N. Y.	1.15	1.30	1.30	1.30	1.30	1.30
Chaumont, N. Y.	.50	1.75	1.75	1.50	1.50	1.50
Chazy, N. Y.	.75	1.65	1.65	1.40	1.40	1.40
Cobleskill, N. Y.	1.50	1.35	1.25	1.25	1.25	.....
Dundas, Ont.	.53	1.05	1.05	.90	.90	.90
Eastern Pennsylvania	1.35	1.35	1.35	1.35	1.35	1.35
Frederick, Md.	.50	.75	1.30	1.20	1.10	1.10
Munns, N. Y.	1.00	1.50	1.50	1.50	1.25	.....
Northern New Jersey	1.60	1.50@1.80	1.30@2.00	1.40@1.60	1.40@1.60	.....
Prospect, N. Y.	1.00	1.40	1.40	1.30	1.30	.....
Walford, Penn.	.80	1.35h	1.35h	1.35h	1.35h	1.35h
Watertown, N. Y.	.50	.....	1.75	1.50	1.50	1.50
Western New York	.85	1.25	1.25	1.25	1.25	1.25
CENTRAL						
Afton, Mich.	.....	.....	.50	.....	.....	1.50
Alton, Ill.	1.85	.....	1.85	.....	.....	.....
Bloomville, Middlepoint, Dunkirk Bellevue, Waterville, No. Baltimore, Holland, Kenton, New Paris, Ohio; Monroe, Mich.; Huntington, Bluffton, Ind.	1.00	1.10	1.10	1.00	1.00	1.00
Buffalo and Linwood, Iowa	1.10	.....	1.20	1.00	1.25	1.25
Chasco, Ill.	1.25	.....	.....	.....	.....	1.15
Columbia, Krause, Valmeyer, Ill.	1.00@1.50	1.20@1.25	1.20@1.25	1.20	1.20	1.50
			Flux all at 1.30			
Cypress, Ill.	1.15	1.15	1.15	1.15	1.05	1.00
Gary, Ill.	1.00	1.37½	1.37½	1.37½	1.37½	1.37½
Greencastle, Ind.	1.25	1.25	1.15	1.05	.95	.95
Lannon, Wis.	.80	1.00	1.00	.90	.90	.90
Milltown, Ind.	.....	.90@1.00	.75@ .85	.90@1.00	.85@ .90	.85
Northern New Jersey	1.30	.....	1.80	1.60	1.40	.....
River Rouge, Mich.	1.10	1.10	1.10	1.10	1.10	1.10
St. Vincent de Paul, Que.	.75	1.25	1.05	.95	.90	.90
Sheboygan, Wis.	1.10	1.10	1.10	1.10	1.10	.....
Toledo, Ohio	1.60	1.70	1.70	1.60	1.60	1.60
Stone City, Iowa	.75	.....	1.10†	1.05	1.00	.....
Waukesha, Wis.	.90	.90	.90	.90	.90	.90
SOUTHERN:						
Allgood, Ala.			Crusher run, fines out, for flux, 1.00 per net ton			
Cartersville, Ga.	.....	1.65	1.65	1.25	1.15	.....
Chico, Texas	1.00	1.40	1.35	1.25	1.20	1.15
El Paso, Tex.	1.00	1.00	1.00	1.00	.....	.....
Ft. Springs, W. Va.	.50	1.60	1.50	1.35	1.25	.....
Graystone, Ala.			Crusher run fluxing stone, 1.00 per net ton			
Henderson, N. C.	.....	.....	1.50	.....	1.25	.....
New Braunfels, Texas	.50@ .60	1.00@1.20	1.00@1.20	.80@1.00	.75@ .90	.75@ .90
Olive Hill, Ky.	.50@1.00‡	1.00	1.00	1.00	1.00	1.00
Rocky Point, Va.	.50@1.00	1.40@1.60	1.30@1.40	1.15@1.35	1.10@1.20	1.00@1.05
WESTERN:						
Atkinson, Kans.	.25	2.00	2.00	2.00	2.00	1.80
Blue Springs & Wymore, Neb.	.25	1.45	1.45	1.35c	1.25d	1.20
Cape Girardeau, Mo.	1.25	.....	1.25	1.25	1.10	.....
Kansas City, Mo.	.75	1.65	1.65	1.65	1.65	1.65
Limestone, Wash.	3.00	3.00	3.00	3.00	3.00	3.00
Rock Hill, St. Louis county, Mo.	1.20	1.35	1.35	1.35	1.35	1.35

Crushed Trap Rock

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Branford, Conn.	.60	1.70	1.45	1.20	1.05	.....
Duluth, Minn.	.90	2.25	1.90	1.50	1.35	1.35
Dwight, Calif.	1.00	1.00	1.00	.90	.90	.....
Eastern Maryland	1.00	1.60	1.60	1.50	1.35	1.35
Eastern Massachusetts	.85	1.75	1.75	1.25	1.25	1.25
Eastern New York	.75	1.25	1.25	1.25	1.25	1.25
Eastern Pennsylvania	1.10	1.70	1.60	1.50	1.35	1.35
Knippa, Texas	2.50	2.00	1.55	1.40	1.25	1.25
New Haven, New Britain, Meriden & Wallingford, Conn.	.80	1.70	1.45	1.20	1.05	1.05
Northern New Jersey	1.60	2.10	1.80	1.50	1.50	.....
Oakland and El Cerritto, Cal.	1.00	1.00	1.00	.90	.90	.....
San Diego, Calif.	.65@ .75	1.70@1.90	1.50@1.70	1.30@1.50	1.20@1.40	.....
Sheboygan, Wis.	1.00	1.10	1.10	1.10	1.10	.....
Springfield, N. J.	1.80	2.25	2.25	1.80	1.80	1.80
Westfield, Mass.	.60	1.50	1.35	1.20	1.10	1.10

Miscellaneous Crushed Stone

City or shipping point	Screenings, ¼ inch down	½ inch and less	¾ inch and less	1½ inch and less	2½ inch and less	3 inch and larger
Berlin, Utley, Montello and Red Granite, Wis.—Granite	1.80	1.70	1.50	1.40	1.40	.....
Coldwater, N. Y.—Dolomite			1.50 all sizes			
Columbia, S. C.—Granite	.....	.....	1.75	.....	1.50	.....
Eastern Penn.—Quartzite	1.20	1.35	1.25	1.20	1.20	1.20
Havelock, Ontario	.....	2.60	2.10	2.10	.....	.....
Lithonia, Ga.—Granite	.75a	2.00	1.75	1.40	1.35	1.25
Lohrville, Wis.—Granite	1.65	1.70	1.65	1.45	1.50	.....
Middlebrook, Mo.—Granite	3.00@3.50	.....	2.00@2.25	2.00@2.25	.....	1.25@2.00
Northern New Jersey (Basalt)	1.50	2.00	1.80	1.40	1.40	.....
Richmond, Calif.—Quartzite	.75	.....	1.00	1.00	1.00	.....
Somerset, Pa. (sand-rock)	1.85@2.00a	.....	1.35@1.50	.....	1.00@1.50	.....
Toccoa, Ga.—Granite	.....	.....	1.60	1.45	1.40	.....

*Cubic yd. †1 in. and less. ‡Two grades. ‖Rip rap per ton. (a) Sand. (b) to ¼ in. (c) 1 in., 1.40. (d) 2 in.. 1.30. (e) Dust. (f) ¼ in. (h) less 10c discount. (i) 1 in., 1.40.

Agricultural Limestone

(Pulverized)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 90% thru 100 mesh	6.00
Asheville, N. C.—Analysis, 57% $CaCO_3$, 39% $MgCO_3$; 50% thru 100 mesh; 200-lb. burlap bag, 4.00; bulk	2.75
Belfast and Rockland, Me. (rail), Lincolnville, Me. (water), analysis $CaCO_3$ 90.04%; $MgCO_3$ 1.5%, 100% thru 14 mesh, bags	4.50
Bulk	3.50
Branchton and Osborne, Penn.—100% thru 20 mesh; 60% thru 100 mesh; 45% thru 200 mesh. (Less 50 cents commission to dealers)	5.00
Cape Girardeau, Mo.—Analysis, 93% $CaCO_3$, 3.5% $MgCO_3$; pulverized; 50% thru 50 mesh	1.50
Cartersville, Ga.—Analysis 68% $CaCO_3$, 32% $MgCO_3$; pulverized	2.50
Chaumont, N. Y.—Pulverized limestone, bags, 4.00; bulk	2.50
Chico, Tex.—⅛ in. down	1.50
200 mesh	10.00
Colton, Calif.—Analysis 90% $CaCO_3$, bulk	4.00
Cypress, Ill.—90% thru 100 mesh	1.35
Danbury, Conn., Rockdale and West Stockbridge, Mass.—Analysis, 90% $CaCO_3$, 5% $MgCO_3$; 50% thru 100 mesh; paper bags, 4.75; cloth, 5.25; bulk	3.25
Henderson, N. C. (paving dust)—80% thru 200 mesh, bags	4.25@ 4.75
Bulk	3.00@ 3.50
Analysis $CaCO_3$, 56%; $MgCO_3$, 42%; 65% thru 200 mesh, bags	3.95
Bulk	2.70
Hillsville, Penn.—Analysis, 94% $CaCO_3$, 1.40% $MgCO_3$; 75% thru 100 mesh; sacked	5.00
Jamesville, N. Y.—Analysis, 89.25% $CaCO_3$; 5.25% $MgCO_3$; pulverized, bags, 4.00; bulk	2.50
Knoxville, Tenn.—Analysis, 52% $CaCO_3$, 37% $MgCO_3$; 80% thru 100 mesh; bags, 3.95; bulk	2.70
Marblehead, Ohio—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$; 60% thru 100 mesh; 70% thru 50 mesh; 100% thru 10 mesh; 80 lb. paper sacks, 5.00; bulk	3.50
Marion, Va.—Analysis, 90% $CaCO_3$, pulverized, per ton	2.00
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 90% thru 100 mesh	3.90@ 4.50
Milltown, Ind.—Analysis, 94.50% $CaCO_3$, 33% thru 50 mesh, 40% thru 50 mesh; bulk	1.35@ 1.60
Olive Hill, Ky.—50% thru 50 mesh, 2.00; 90% thru 4 mesh	1.00
Piqua, Ohio—Total neutralizing power 95.3%; 99% thru 10, 60% thru 50; 50% thru 100	2.50@ 2.75
100% thru 10, 90% thru 50, 80% thru 100; bags, 5.10; bulk	3.60
99% thru 100, 85% thru 200; bags, 7.00; bulk	5.50
Rocky Point, Va.—Analysis 99.5% $CaCO_3$, 0.25% $MgCO_3$; 50% thru 200 mesh; bags, 3.25@3.50; bulk	2.00
Toledo, Ohio, 30% through 50 mesh	2.25
Waukesha, Wis.—90% thru 100 mesh, 4.50; 50% thru 100 mesh	2.10
Watertown, N. Y.—Analysis, 96-99% $CaCO_3$; 50% thru 100 mesh; bags, 4.00; bulk	2.50

Agricultural Limestone

(Crushed)

Alton, Ill.—Analysis 99% $CaCO_3$, 0.3% $MgCO_3$; 50% thru 4 mesh	3.00
Atlas, Ky.—Analysis over 90% $CaCO_3$; 90% thru 4 mesh	1.00@ 2.00
Bedford, Ind.—Analysis, 98.5% $CaCO_3$, 0.5% $MgCO_3$; 90% thru 10 mesh	1.50
Bettendorf, Iowa—97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh	1.50
Blackwater, Mo.—Analysis, 99% $CaCO_3$; 90% thru 4 mesh	.75
Bridgeport and Chico, Texas—Analysis, 94% $CaCO_3$, 2% $MgCO_3$; 100% thru 10 mesh	1.75
50% thru 4 mesh	1.50
Chasco, Ill.—50% thru 100 mesh	1.20
Chico, Texas—50% thru 50 mesh; bulk	1.50

(Continued on next page)

Agricultural Limestone

Chicago, Ill.—50% thru 100 mesh; 90% thru 4 mesh ..... .80
Columbia, Krause, Valmeyer, Ill.—Analysis, 90% $CaCO_3$; 90% thru 4 mesh 1.35
Cypress, Ill.—90% thru 50 mesh, 50% thru 100 mesh, 90% thru 50 mesh, 90% thru 4 mesh, 50% thru 4 mesh 1.35
Dundas, Ont.—Analysis, 53.8% $CaCO_3$; $MgCO_3$, 43.3%. 50% thru 50 mesh; bags, $4.75; bulk 3.00
Ft. Springs, W. Va.—Analysis, 90% $CaCO_3$; 90% thru 50 mesh 1.50
Garnet, Okla.—All sizes 1.25
Gary, Ill.—Analysis, approx. 60% $CaCO_3$, 40% $MgCO_3$; 90% thru 4 mesh ..... .90
Kansas City, Mo.—50% thru 50 mesh ..... .75
Lannon, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 99% through 10 mesh; 46% through 60 mesh 2.00
Screenings (¼ in. to dust) 1.00
Marblehead, Ohio.—Analysis, 83.54% $CaCO_3$, 14.92% $MgCO_3$, 32% thru 100 mesh; 51% thru 50 mesh; 83% thru 10 mesh; 100% thru 4 mesh (meal) bulk 1.60
Mayville, Wis.—Analysis, 54% $CaCO_3$, 44% $MgCO_3$; 50% thru 50 mesh .... 1.85@ 2.35
Middlepoint, Bellevue, Kenton, Ohio; Monroe, Mich.; Huntington and Bluffton, Ind.—Analysis, 42% $CaCO_3$, 54% $MgCO_3$; meal, 25 to 45% thru 100 mesh 1.60
Moline, Ill., and Bettendorf, Iowa—Analysis, 97% $CaCO_3$, 2% $MgCO_3$; 50% thru 100 mesh; 50% thru 4 mesh 1.50
Pixley, Mo.—Analysis, 96% $CaCO_3$; 50% thru 50 mesh 1.25
50% thru 100 mesh; 90% thru 50 mesh; 50% thru 50 mesh; 90% thru 4 mesh; 50% thru 4 mesh 1.65
River Rouge, Mich.—Analysis, 54% $CaCO_3$, 40% $MgCO_3$; bulk ..... .80@ 1.40
Stone City, Iowa.—Analysis, 98% $CaCO_3$; 50% thru 50 mesh ..... .75
Tulsa, Okla.—Analysis $CaCO_3$, 86.15%, 1.25% $MgCO_3$, all sizes 1.25

Pulverized Limestone for Coal Operators

Hillsville, Penn., sacks, 4.50; bulk 3.00
Piqua, Ohio, sacks, 4.50@5.00 bulk .... 3.00@ 3.50
Rocky Point, Va.—80% thru 200 mesh; bags, 4.25@4.75; bulk ..... 3.00@ 3.50
Waukesha, Wis.—90% thru 100 mesh, bulk 4.50

Glass Sand

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

Berkeley Springs, W. Va.—Glass sand .. 2.25
Cedarville and S. Vineland, N. J.—
Damp 1.75
Dry 2.25
Cheshire, Mass.:
6.00 to 7.00 per ton; bbl 2.50
Columbus, Ohio ..... 1.25@ 1.50
Estill Springs and Sewanee, Tenn 1.50
Franklin, Penn. 2.25
Gray Summit and Klondike, Mo 2.00
Los Angeles, Calif.—Washed 5.00
Mapleton Depot, Penn ..... 2.00@ 2.25
Massillon, Ohio 3.00
Mineral Ridge and Ohlton, Ohio 2.50
Oceanside, Calif. 3.00
Ottawa, Ill. (Contracts) 1.00
Pittsburgh, Penn.—Dry 4.00
Damp 3.00
Red Wing, Minn.:
Bank run 1.50
Ridgway, Penn. ..... 2.00@ 2.50
Rockwood, Mich. ..... 2.75@ 3.25
Round Top, Md. 2.25
San Francisco, Calif. ..... 4.00@ 5.00
St. Louis, Mo. 2.00
Sewanee, Tenn. 1.50
Thayers, Penn. 2.50
Utica, Ill. 1.00
Zanesville, Ohio 2.50

Miscellaneous Sands

City or shipping point	Roofing sand	Traction
Beach City, Ohio		1.75
Columbus, Ohio		.30@ .90
Eau Claire, Wis.	4.25	
Estill Springs and Sewanee, Tenn.	1.35@ 1.50	1.35@ 1.50

(Continued on next page)

Wholesale Prices of Sand and Gravel

Prices given are per ton, F.O.B., producing plant or nearest shipping point

Washed Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
EASTERN:						
Ambridge & So. H'g'ts, Penn.	1.25	1.25	1.15	.85	.85	.85
Attica and Franklinville, N. Y.	.75	.75	.85	.75	.75	.75
Buffalo, N. Y.	1.10	.95			.85	
Erie, Pa.		1.00*		1.50*	1.75*	
Farmingdale, N. J.	.58	.48	.75	1.20	1.10	
Hartford, Conn.	.65*					
Leeds Junction, Me.		.50	1.75		1.35	1.25
Machias Jct., N. Y.		.75	.75		.75	.75
Montoursville, Penn.	1.35	1.10	1.00	.75	.75	.75
Northern N. J.		.45@ .70	.45@ .70	1.45	1.45	.145
Olean, N. Y.		.75	.75	.75	.75	.75
Shining Point, Penn.			1.00	1.00	1.00	1.00
Somerset, Pa.		1.85@2.00		1.35@1.50		
South Heights, Penn.	1.25	1.25	.85	.85	.85	.85
Washington, D. C.	.85	.85	1.70	1.50	1.30	1.30
CENTRAL:						
Algonquin and Beloit, Wis.	.50	.40	.60	.60	.60	.60
Attica, Ind.			All sizes .75@.85			
Barton, Wis. (f)		.50		.75	.75	.75
Boston, Mass.‡	1.50	1.50	2.50		2.50	2.50
Chicago, Ill.	.70	.50	.50	.60	.60	.60
Columbus, Ohio		.65@ .70	.65@ .70	.65@ .70	.65@ .70	.65@ .70
Des Moines, Iowa	.40	.40	1.50	1.50	1.50	1.50
Eau Claire, Wis.	.50	.50	.95	.95	.95	.95
Elgin, Ill.		.20*	.50*	1.50*	1.50*	1.50*
Elkhart Lake, Wis.	.60	.50	.50	.60	.50	.40
Ferrysburg, Mich.		.50@ .80	.60@1.00	.60@1.00		.50@1.25
Ft. Dodge, Iowa	.85	.85	2.05	2.05	2.05	2.05
Ft. Worth, Texas	2.00	2.00	2.00	2.00	2.00	2.00
Grand Haven, Mich.		.40@ .80		.60@1.00		
Grand Rapids, Mich.		.50		.80		.90
Hamilton, Ohio		1.00			1.00	
Hersey, Mich.		.50		.70	.70	.60
Humboldt, Iowa		.85	2.00	2.00	2.00	
Indianapolis, Ind.	.60	.60		.90	.75@1.00	.75@1.00
Mason City, Iowa	.45@ .55	.45@ .55	1.35@1.45	1.45@1.55	1.40@1.50	1.35@1.45
Mankato, Minn.		.50		1.35	1.35	1.35
Mattoon, Ill.	.75	.75	.75	.75	.75	.75
Milwaukee, Wis.		1.01	1.21	1.21	1.21	1.21
Moline, Ill.	.60@ .85	.60@ .85	1.00@1.20	1.00@1.20	1.00@1.20	1.00@1.20
Northern New Jersey	.70	.70			1.60	
Oregon City, Ore.		1.25	1.25	1.25	1.25	1.25
Palestine, Ill.	.75	.75	.75	.75	.75	.75
Silverwood, Ind.	.75	.75	.75	.75	.75	.75
St. Louis, Mo.	1.18	1.45	1.65	1.45	1.65	1.45c
Terre Haute, Ind.	.75	.75	.75	.75	.75	.75
Wolcottville, Ind.	.75	.75	.75	.75	.75	.75
Waukesha, Wis.		.45	.60	.60	.65	.65
Winona, Minn.	.40	.40	1.25	1.25	1.10	1.00
Yorkville, Sheridan, Oregon, Moronts, Ill.		.40@ .70	.30@ .50	.50@ .60	.60	.60
Zanesville, Ohio		.70	.50		.80	
SOUTHERN:						
Charleston, W. Va.		All sand, 1.40.		All gravel, 1.50.		
Chattanooga, Tenn.		1.45			1.20	1.20
Knoxville, Tenn.	1.00	1.00	1.20	1.20	1.20	1.00
Lindsay, Texas					.55	
Macon, Ga.	.50	.50		1.00	1.00	1.00
New Martinsville, W. Va.	1.00	.90@1.00		1.20@1.30		.80@ .90
Roseland, La.	.35	.25	2.25	.75	.75	2.00
WESTERN:						
Kansas City, Mo.	.80	.70				
Los Angeles, Calif. (points all around) (d)	.60	.50	.85	.85	.85	.85
Los Angeles district (bunkers) †	1.50	1.40	1.85	1.85	1.85	1.85
Phoenix, Ariz.	1.25*	1.00*	2.50*	2.00*@2.25*	1.75*	1.50*
Pueblo, Colo.	.80	.65		1.35		1.20
San Diego, Calif.	.65@ .75	.65@ .75	1.50@1.60	1.20@1.40		1.00@1.20
Seattle, Wash. (bunkers)	1.50*	1.50*	1.50*	1.50*	1.50*	1.50*

Bank Run Sand and Gravel

City or shipping point	Fine Sand, 1/10 in. down	Sand, ¼ in. and less	Gravel, ½ in. and less	Gravel, 1 in. and less	Gravel, 1½ in. and less	Gravel, 2 in. and less
Algonquin and Beloit, Wis.			Dust to 3 in., .40			
Boonville, N. Y.	.60@ .80		.55@ .75			1.00
Chicago, Ill.	.95					
Des Moines, Iowa	.50					
Dudley, Ky.	1.10	1.00	.90			
East Hartford, Conn.			Sand, 65*			
Elkhart Lake, Wis.	.50					
Ferrysburg, Mich.						.65@1.00
Gainesville, Texas		.95				.55
Grand Rapids, Mich.	.50	.50		.60		
Hamilton, Ohio					.70	
Hersey, Mich.				.50		
Indianapolis, Ind.			Mixed gravel for concrete work, at .65			
Lindsay, Texas	1.30					.55
Macon, Ga.	.40					
Mankato, Minn.			Pit run sand, .50			
Moline, Ill. (b)	.60	.60	Concrete gravel, 50% G., 50% S., 1.00			
Ottawa, Oregon, Moronto and Yorkville, Ill.			Ave. .60 per ton all sizes			
Roseland, La.	.60					
St. Louis, Mo.			Mine run gravel, 1.55 per ton			
Shining Point, Penn.			Concrete sand, 1.10 ton			
Smithville, Texas	.50	.50	.50	.50	.50	.54
Summit Grove, Ind.	.50	.50	.50	.50	.50	.54
Waukesha, Wis.	.60	.60	.60	.60	.60	.64
Winona, Minn.	.60	.60	.60	.60	.60	.64
York, Penn.	1.10	1.00				

(a) ¾ in. down. (b) River run. (c) 2½ in. and less.
*Cubic yd. †Include freight and bunkerage charges and truck haul. ‡Delivered on job.
(d) Less 10c per ton if paid E.O.M. 10 days. (e) pit run. (f) plus 15c winter loading charge.

Core and Foundry Sands

Silica sand is quoted washed, dried and screened unless otherwise stated. Prices per ton f.o.b. producing plant.

City or shipping point	Molding, fine	Molding, coarse	Molding, brass	Core	Furnace lining	Sand blast	Stone sawing
Aetna, Ill.				.30@ .35			
Albany, N. Y.	2.75	2.75	2.75	1.00@2.75		1.50@4.00	
Arenzville, Ill.	1.50@1.75			1.00			
Beach City, Ohio	1.75@2.00	1.75@2.00		1.75	2.00@2.50	2.00	1.75@2.00
Columbus, Ohio	2.00@2.50	1.50@2.50	2.00@3.00	.20@ .30	2.50	3.50@4.50	1.50@2.00
Eau Claire, Wis.						3.00	3.00
Elco, Ill.	Ground silica per ton in carloads—18.00@31.00						
Elnora, N. Y.			1.75				
Estill Springs and Sewanee, Tenn.	1.25			1.25		1.35@1.50	
Franklin, Penn.	1.75	1.75	2.00	2.00	2.00		
Gray Summit and Klondike, Mo.	1.75	1.75	2.00	2.00	1.00		.85@1.00
Joliet, Ill.	No. 2 molding sand; loam for luting and open hearth work—.65@.85						
Kasota, Minn.							1.00@1.25
Mapleton Depot, Penn.	2.00	2.00				2.00	
Massillon, Ohio	2.50	2.50		2.50	2.50		
Michigan City, Ind.				.15@ .30			
Mineral Ridge and Ohlton, Ohio	1.75*	1.75*		2.50	1.75*	1.75*	
Montoursville, P'n.				1.25@1.35			
New Lexington, O.	2.00	1.50					
Ottawa, Ill.		.75@1.00†					
Red Wing, Minn.	1.25		1.25	1.50	1.50	3.50	1.50
Ridgeway, Penn.	1.50	1.50		2.00@2.50			
Round Top, Md.				1.60		2.25	
San Francisco, Calif.	3.50	4.75	3.50	3.50@5.00	3.50@4.50	3.50@5.00	
Tamalco, Ill.		1.50@1.75					
Tamms, Ill.	Ground silica per ton in carloads—20.00@31.00						
Thavers, Penn.	1.25	1.25		2.00			
Utica, Ill.	.65	.75		.75	.75		
Utica, Penn.	1.75	1.75		2.00			
Warwick, Ohio	1.75*@2.25	1.75*		1.75*@2.25			
Zanesville, Ohio	2.00‡	1.50‡	2.00‡		2.00		

*Damp. †Crude silica, not washed or dried. ‡Plus 75c per ton for winter loading.

Crushed Slag

City or shipping point	Roofing	¼ in. down	½ in. and less	¾ in. and less	1½ in and less	2½ in. and less	3 in. and larger
EASTERN:							
Buffalo, N. Y., Emporium nd Dubois, Pa.	2.25	1.25	1.25	1.25	1.25	1.25	1.25
Eastern Penn. and Northern N. J.	2.50	1.20	1.50	1.20	1.20	1.20	1.20
Reading, Pa.	2.50	1.00		1.25			
Western Penn.	2.50	1.25	1.50	1.25	1.25	1.25	1.25
CENTRAL:							
Ironton, Ohio	2.05*	1.45*	1.80*	1.45*		1.45*	
Jackson, Ohio		1.05*		1.30*	1.30*	1.30*	1.30*
Toledo, Ohio	1.50	1.25	1.50	1.25	1.25	1.25	1.25
Youngst'n, O., dist.	2.00	1.25	1.35	1.35	1.25	1.25	1.25
SOUTHERN:							
Ashland, Ky.		1.55*		1.55*	1.55*	1.55*	1.55*
Ensley and Alabama City, Ala.	2.05	.80	1.35	1.25	.90	.90	.80
Longdale, Roanoke, Ruessens, Va.	2.50	1.00	1.25	1.25	1.25	1.15	1.15
Woodward, Ala.		.80		1.25	.90@1.05	.90	

*5c per ton discount on terms.

Lime Products (Carload Prices Per Ton F.O.B. Shipping Point)

	Finishing hydrate	Masons' hydrate	Agricultural hydrate	Chemical hydrate	Ground burnt lime, Blk.	Ground burnt lime, Bags	Lump lime, Blk.	Lump lime, Bbl.
EASTERN:								
Berkeley, R. I.			12.00					2.20
Buffalo, N. Y.		12.00	12.00	12.00			10.00	1.95d
Chazy, N. Y.	12.50	10.50	8.00	12.00	11.50	16.50	10.00	2.50_2
Lime Ridge, Penn.							5.00a	
West Stockbridge, Mass.	12.00	10.00	5.60					2.00t
Williamsport, Penn.			10.00				6.00	
York, Penn.		9.50	9.50	10.50			8.00	1.65i
CENTRAL:								
Afton, Mich.					8.50	1.61		
Carey, Ohio	12.50	8.50@9.50	9.50		9.50		9.00	
Cold Springs, Ohio	12.50	8.50	8.50		9.00		8.00	
Delaware, Ohio	12.50	10.00	9.00	10.00			9.00	1.50
Frederick, Md.		10.00	9.50	10.00			7.50	1.45
Gibsonburg, Ohio (f)	12.50							
Huntington, Ind.		8.50	8.50		9.00	11.00	8.00	1.50c
Luckey, Ohio (f)	12.50							
Marblehead, Ohio		8.50	8.50		9.00		8.00	1.50c
Marion, Ohio		8.50						1.70d
Milltown, Ind.		9.00@10.00		10.00p	8.00_3			1.40r
Sheboygan, Wis.		11.50					9.50	
Tiffin, Ohio					9.00			
White Rock, Ohio	12.50				9.00	11.00		
Wisconsin points (f)		11.50					9.50	
Woodville, Ohio	12.50†	8.50†	8.50†	13.50†	9.00	11.00_1	9.00	1.50c
SOUTHERN:								
Allgood, Ala.	12.50	10.00			8.50		8.50	1.50
El Paso, Tex.							14.00	1.75
Graystone, Landmark and Wilmay, Ala.	12.50	10.00			8.50		8.50	
Keystone, Ala.	12.00	10.00	10.00	10.00	9.00		8.50	1.50u
Knoxville, Tenn.	12.50	10.00	10.00	10.00	8.50		8.50	1.50
Ocala, Fla.		14.00	10.00		13.00	1.60_1		1.70
WESTERN:								
Calcite, Colo.							9.25	
Kirtland, N. M.							15.00	
Limestone, Wash.	15.00	15.00	10.00	15.00	16.50	16.50	16.50	2.09
New Braunfels, Texas	12.00	12.00	10.00	12.00			9.50	1.50
San Francisco, Calif.	21.00	21.00	12.50@15.00	21.00			14.50	1.90v
Tehachapi, Calif.			8.00				13.00z	2.20x
Seattle, Wash.	19.00	19.00	12.00	19.00	19.00		18.60	2.30

†50-lb. paper bags; (a) run of kilns; (c) wooden, steel 1.70; (d) steel; (e) per 180-lb. barrel; (f) dealers' prices; (g) to 9.50; (h) to 1.75; (i) 180-lb. net barrel 1.65; 280-lb. net barrel, 2.65 (m) finishing lime, 3.00 common; (n) common lime; (o) high calcium; (p) to 10.50; (q) to 8.50; (r) to 1.50; (s) in 80-lb. burlap sacks; (t) to 3.00; (u) two 90-lb. bags; (v) oil burnt; wood burnt 2.25@2.50; (x) wood, steel 2.30; (z) to 15.00; (*) quoted f.o.b. New York; (‡) paper bags; (w) to 1.50 in two 90-lb. bags, wood bbl. 1.60; (¶) to 10.00; ($_1$) 80-lb. paper bags; ($_2$) to 3.00; ($_3$) to 9.00.

Miscellaneous Sands

(Continued)

City or shipping point	Roofing sand	Traction
Gray Summit and Klondike, Mo.	2.00	1.75
Mapleton, Depot, Penn.		2.00
Massillon, Ohio		2.25
Mineral Ridge and Ohlton, Ohio	*1.75@ 2.00	*1.75
Montoursville, Penn.		1.10
Ottawa. Ill.	1.25@ 1.50	
Red Wing, Minn.		1.25
Round Top, Md.	2.25	1.75
San Francisco, Calif.	3.50@ 4.50	3.50@ 4.50
Thayers, Penn.		2.25
Utica, Ill.	1.00	1.00
Warwick, Ohio		2.25
Zanesville, Ohio		2.50

Talc

Prices given are per ton f.o.b. (in carload lots only), producing plant, or nearest shipping point,

Baltimore, Md.:	
Crude talc (mine run)	3.00@ 4.00
Ground talc (20-50 mesh), bags	10.00
Cubes	55.00
Blanks (per lb.)	.08
Pencils and steel worker's crayons, per gross	.08
	1.25
Chatsworth, Ga.:	
Crude Talc	4.50
Ground (20-50 mesh), bulk	6.50@ 8.50
Ground (150-200 mesh), bulk	8.00@10.00
Pencils and steel worker's crayons, per gross	1.50
Chester, Vt.:	
Ground talc (150-200 mesh), bulk	10.00@11.00
Including bags	11.00@12.00
Chicago and Joliet, Ill.:	
Ground (150-200 mesh), bags	30.00
Dalton, Ga.:	
Crude talc	5.00
Ground talc (150-200) bags	10.00@12.00
Pencils and steel workers' crayons, per gross	1.00@ 1.50
Emeryville, N. Y.:	
(Double air floated) including bags;	
325 mesh	14.75
200 mesh	13.75
Hailesboro, N. Y.:	
Ground white talc (double and triple air floated) including bags, 300-350 mesh	15.50@20.00
Henry, Va.:	
Crude (mine run)	3.50@ 4.50
Ground talc (150-200 mesh), bags	9.75@12.50
Joliet, Ill.:	
Ground talc (150-200) bags	30.00
Keeler, Calif.:	
Ground (200-300 mesh), bags	20.00@30.00
Natural Bridge, N. Y.:	
Ground talc (300-325 mesh), bags	14.00

Rock Phosphate

Prices given are per ton (2240-lb.) f.o.b. producing plant or nearest shipping point.

Lump Rock

Gordonsburg, Tenn.—B.P.L. 68-72%	4.50@ 5.00
Mt. Pleasant, Tenn.—B.P.L. 72-75%	5.50@ 6.00
Tennessee—F.O.B. mines, gross ton, unground brown rock, B.P.L. 72%	5.00
B.P.L. 75%	6.00
Twomey, Tenn.—B.P.L. 65%, 2000 lb.	7.00@ 8.00

Ground Rock

(2000 lbs.)

Centerville, Tenn.—B.P.L. 65%	7.00
Gordonsburg, Tenn.—B.P.L. 65-70%	4.00@ 4.50
Mt. Pleasant, Tenn. — B.P.L. 65%; bags, 9.00; bulk	7.00
Twomey, Tenn.—B.P.L. 65%	7.25

Florida Phosphate

(Raw Land Pebble)

(Per Ton.)

Florida—F. O. B. mines, gross ton, 68/66% B.P.L., Basis 68%	3.00
70% min. B.P.L., Basis 70%	3.25
72% min. B.P.L., Basis 72%	4.25
75/74% B.P.L., Basis 75%	5.00
77/76% B.P.L., Basis 77%	6.00

Mica

Prices given are net, F.O.B. plant or nearest shipping point.

Keene, N. H.—Mine and clean shop scrap, per short ton	30.00
Punch, per lb.	.15
Pulverized, per ton, 20 mesh	35.00
40 mesh	45.00
60 and 100 mesh	75.00
Roofing grade, per ton	36.00
(carloads)	150.00@200.00
Pringle, S. D.—Mine run, per ton,	
Punch mica, per lb.	.05@ .07
Scrap, per ton, carloads	19.00@ 20.00

Special Aggregates

Prices are per ton f.o.b. quarry or nearest shipping point.

City or shipping point	Terrazzo	Stucco-chips
Barton, Wis., f.o.b. cars	.....	10.50
Brandon, Vt.—English pink and English cream	*11.00	*11.00
Buckingham, Que.—Buff stucco dash	.....	‡12.00@14.00
Chicago, Ill. — Stucco chips, in sacks f.o.b. quarries	.....	17.50
Crown Point, N. Y.—Mica Spar	.....	8.00@10.00
Easton, Penn.—Green	16.00@20.00	16.00@20.00
Haddam, Conn. — Felstone buff	15.00	15.00
Harrisonburg, Va.—Blk marble (crushed, in bags)	†12.50	†12.50
Ingomar, Ohio — Concrete facings and stucco dash	.....	6.00@18.00
Middlebrook, Mo.—Red	.....	20.00@25.00
Middlebury and Brandon, Vt.—Middlebury white	.....	‡9.00
Milwaukee, Wis.	.....	14.00@34.00
Newark, N. J.—Roofing granules	.....	7.50
New York, N. Y.—Red and yellow Verona	.....	32.00
Red Granite, Wis.	.....	7.50
Sioux Falls, S. D.	7.50	7.50
Stockton, Calif. — "Natrock" roofing grits	.....	12.00@16.00
Tuckahoe, N. Y.	.....	12.00
Villa Grove, Colo.	.....	13.00
Wauwatosa, Wis.	.....	16.00@45.00
Wellsville, Colo.—Colorado Travertine Stone	15.00	15.00

†C.L.
*C.L. including bags; L.C.L. 14.50.
‡C.L. including bags, L.C.L. 10.00.

Potash Feldspar

Auburn and Brunswick, Me.—Color, white; 98% thru 140 mesh bulk	19.00
Bath, Me.—Color, white; analysis, potash, 12%; 100% thru 180 mesh, bags, 21.00; bulk	18.00
Buckingham, Que.—Color, white; analysis, K_2O, 12-13%; Na_2O, 1.75%; bulk	9.00
De Kalb Jct., N. Y.—Color, white; bulk (crude)	9.00
East Hartford, Conn.—Color, white, 95% thru 80 mesh	18.00
Finer grades	20.00@23.00
Erwin, Tenn.—Color, white; analysis, 12.07% K_2O, 19.34% Al_2O_3; Na_2O, 2.92%; SiO_2, 64.76%; Fe_2O_3, .36%; 98.50% thru 200 mesh, bags, 16.90; bulk	15.50
Glen Tay Station, Ont., color, red or punk; analysis: K_2O, 12.81%, crude, bulk	6.00@ 7.50
Los Angeles, Calif.—Color, white; analysis, K_2O, 10.35%; Na_2O, 3.62%; Al_2O_3, 18.71%; SiO_2, 65.48%; Fe_2O_3, .17%; 100% thru 150 mesh, bags included, C.L.	22.00
Bulk	20.00
Murphysboro, Ill.—Color, snow white; analysis SiO_2, 64.4%; K_2O, 13%; Na_2O, 2.5%; Fe_2O_3, 0.07%; Al_2O_3, 19.3%; 98% thru 200 mesh, bags	22.80
Bulk	22.00
Penland, N. C.—Color, white; crude, bulk	8.00
Ground, bulk	16.50
Tenn. Mills—Color, white; analysis K_2O, 18%; Na_2O_3, 10%; 68% SiO_2; 99% thru 200 mesh; bulk	18.00
99% thru 140 mesh, bulk	16.00
Toronto, Can.—Color, flesh; analysis K_2O, 12.75%; Na_2O, 1.96%; crude	7.50@ 8.00
Trenton, N. J.—Crude, bulk	12.00@27.00
99% thru 140 mesh; bulk	16.00
(Bags 11 cents each, non-returnable)	
Wheeling, W. Va.—Color, white; analysis,, K_2O, 9.50%; Al_2O_3, 16.70%; Na_2O, 3.50%; SiO_2, 69.50%; 99% thru 140 mesh, bulk	19.00

Blended Feldspar
(Pulverized)

Tenn. Mills—Bulk	16.00@20.00
Toughkenamon, Pa.—Color, white to light cream; 98% thru 125-150 mesh, bags, 12.00@13.00; bulk	10.00

Chicken Grits

Afton, Mich. (limestone) per ton	15.00
Belfast and Rockland, Me.—(Limestone), bags, per ton	‡10.00
Brandon and Middlebury, Vt., per ton	12.00‡
Centerville, Iowa (gypsum) per ton	18.00
Los Angeles Harbor (limestone), 100-lb sack, 1.00; sacks, per ton, 8.50@ 9.50†; bulk, per ton	6.00@7.00†
Toughkenamon, Pa.—(Feldspar) 100-lb. bags, 1.00; bulk, per ton	10.00
Danbury, Conn., Rockdale and West Stockbridge, Mass. — (Limestone) bulk	7.50@9.00*
Gypsum, Ohio.—(Gypsum) per ton	10.00
Limestone, Wash. (limestone) per ton	12.50
Rocky Point, Va. (limestone) 100 lb. bags, 75c; sacks, per ton, 6.00 bulk	5.00
Seattle, Wash.—(Limestone), bulk, per ton	12.50
Waukesha, Wis.—(Limestone), per ton	7.00

*L.C.L.
†Less than 5-ton lots.
‡C.L.

Sand-Lime Brick

Prices given per 1000 brick f.o.b. plant or nearest shipping point, unless otherwise noted.

Barton, Wis.	10.50
Boston, Mass	14.50
Brighton, N. Y.	*19.75
Dayton, Ohio	12.50@13.50
Detroit, Mich.	††17.50
Farmington, Conn.	16.00
Flint, Mich.	¶12.50@16.00
Grand Rapids, Mich.	12.00
Hartford, Conn.	*19.00
Jackson, Mich.	13.00
Lancaster, N. Y.	13.50
Madison, Wis.	12.00
Michigan City, Ind.	12.00
Milwaukee, Wis.	*13.00
Minneapolis and St. Paul, Minn.	11.25
New Brighton, Minn.	10.00
Pontiac, Mich.	12.50@13.50
Portage, Wis.	15.00
Rochester, N. Y. (del. on job)	19.75
Saginaw, Mich.	13.00
San Antonio, Texas	13.00@13.50
Sebewaing, Mich.	12.00
Syracuse, N. Y.	18.00
Terra Cotta, D. C.	13.50
Toronto, Canada	13.00
Wilkinson, Fla.-White	12.00
Buff	16.00

*Delivered on job. †Delivered in city limits.
‡Less 5%. ¶Dealers' price.

Portland Cement

Prices per bag and per bbl, without bags net in carload lots.

	Per Bag	Per Bbl.
Albuquerque, N. M.	.....	3.47
Atlanta, Ga.	.....	2.35
Baltimore, Md.	.....	2.35
Birmingham, Ala.	.....	2.30
Boston, Mass.	.....	2.53
Buffalo, N. Y.	.....	2.28
Butte, Mont.	.90¼	3.61
Cedar Rapids, Iowa	.....	2.34
Charleston, S. C.	.....	2.35
Cheyenne, Wyo.	.82¾	3.31
Cincinnati, Ohio	.....	2.37
Cleveland, Ohio	.....	2.29
Chicago, Ill.	.....	2.10
Columbus, Ohio	.....	2.34
Dallas, Texas	.....	2.10
Davenport, Iowa	.....	2.29
Dayton, Ohio	.....	2.38
Denver, Colo.	.66¼	2.65
Detroit, Mich.	.....	2.15
Duluth, Minn.	.....	2.09
Houston, Texas	.....	2.60
Indianapolis, Ind.	.....	2.29
Jackson, Miss.	.....	2.60
Jacksonville, Fla.	.....	2.50
Jersey City, N. J.	.....	2.33
Kansas City, Mo.	.....	2.02
Los Angeles, Calif.	.61†	.....
Louisville, Ky.	.....	2.27
Memphis, Tenn.	.....	2.60
Milwaukee, Wis.	.....	2.25
Minneapolis, Minn.	.....	2.32
Montreal, Que.	.....	1.90
New Orleans, La.	.....	2.40
New York, N. Y.	.....	2.15
Norfolk, Va.	.....	2.17
Oklahoma City, Okla.	.....	2.56
Omaha, Neb.	.....	2.51
Peoria, Ill.	.....	2.27
Philadelphia, Penn.	.....	2.41
Phoenix, Ariz.	.....	3.70
Pittsburgh, Penn.	.....	2.09
Portland, Colo.	.72½	2.90
Portland, Ore.	.....	2.90
Reno, Nevada	.75¼	3.01
Richmond, Va.	.....	2.44
Salt Lake City, Utah	.70¼	2.81
San Francisco, Calif.	.....	2.31
Savannah, Ga.	.....	2.50
St. Louis, Mo.	.55	2.20
St. Paul, Minn.	.....	2.32
Seattle, Wash.	10c discount	2.65
Tampa, Fla.	.....	2.60
Toledo, Ohio	.....	2.20
Topeka, Kans.	.....	2.40
Tulsa, Okla.	.....	2.43
Wheeling, W. Va.	.....	2.17
Winston-Salem, N. C.	.....	2.79

NOTE—Add 40c per bbl. for bags.
†Delivered on job in any quantity, sacks extra.

Mill prices f.o.b. in carload lots, without bags, to contractors.

	Per Bag	Per Bbl.
Buffington, Ind.	.....	1.85
Chattanooga, Tenn.	.....	2.45*
Concrete, Wash.	.....	2.35
Davenport, Calif.	.....	2.05
Detroit, Mich.	.....	2.15
Hannibal, Mo.	.....	2.05
Hudson, N. Y.	.....	2.05
Leeds, Ala.	.....	1.95
Mildred, Kans.	.....	2.35
Nazareth, Penn.	.....	1.95
Northampton, Penn.	.....	1.95
Steelton, Minn.	.....	1.90
Toledo, Ohio	.....	2.20
Universal, Penn.	.....	1.85

*Including sacks at 10c each.

Gypsum Products—CARLOAD PRICES PER TON AND PER M SQUARE FEET, F. O. B. MILL

	Crushed Rock	Ground Gypsum	Agricultural Gypsum	Stucco Calcined Gypsum	Cement and Gauging Plaster	Wood Fiber	White Gauging	Sanded Plaster	Keene's Cement	Trowel Finish	—Plaster Board— ¼x32x 36". Wt. 1500 lb. Per M Sq. Ft.	⅜x32x 36". Wt. 1850 lb. Per M Sq. Ft.	Wallboard, ⅜x32 or 48". Lgths 6'-10', 1850 lb. Per M Sq. Ft.
Arden, Nev. and Los Angeles, Calif.	3.00	8.00u	8.00u	10.70u	10.70u	.....	.....	.....	.....	11.70u	.....	.....	.....
Centerville, Iowa	2.50	12.00m	12.00m	7.00	8.00	8.50	10.00	.....	25.80	10.00	.....	.....	.....
Detroit, Mich.‡	.....	.....	.....	11.30	11.30	11.30	.....	8.00	.....	.....	.....	.....	.....
Delawanna, N. J.	.....	.....	.....	.....	.....	.....	.....	9.00@9.40	.....	.....	.14@.15s	.15@.16s	40.00
Douglas, Ariz.	.....	.....	7.00	.....	.....	15.50d	18.50	.....	30.00	15.50	.....	.....	.....
Grand Rapids, Mich.	2.75	6.00	6.00	8.00	9.00	9.00	17.50	.....	24.55	20.00	.....	.....	.....
Gypsum, Ohio‡	3.00	4.00	6.00	7.00	9.00	9.00	19.00	7.00	27.00	19.00	.....	15.00	30.00
Hanover, Mont.	.....	.....	.....	11.80	.....	.....	.....	.....	.....	.....	.....	.....	.....
Los Angeles, Calif.	.....	.....	.....	10.30k	.....	.....	.....	.....	.....	.....	.....	.....	.....
Port Clinton, Ohio	3.00	4.00	6.00	10.00	9.00	9.00	21.00	7.00	30.15	20.00	.....	20.00	30.00
Portland, Colo.	.....	.....	.....	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
San Francisco, Calif.	.....	.....	.....	13.40r	14.40r	.....	15.40r	.....	.....	.....	.....	.....	.....
Seattle, Wash.	6.70	.....	11.00	10.00	.....	.....	.....	.....	.....	.....	.....	.....	.....
Sigurd, Utah	.....	.....	.....	.....	.....	.....	.....	.....	18.00a	.....	.....	.....	.....
Winnipeg, Man.	5.00	5.00	7.00	13.00	14.00	14.00	.....	.....	.....	.....	20.00	25.00	33.00

NOTE—Returnable bags, 10c each; paper bags, 1.00 per ton extra (not returnable).
*To 3.00; †to 11.00; ¶to 12.00; ‡prices per net ton, sacks extra; (a) to 25.00; (b) net; (c) gross; (d) hair fibre; (f) delivered; (h) delivered in six states; (i) delivered on job; (k) sacks 12c extra, rebated; (m) includes paper bags; (o) includes jute sacks; (r) including sacks at 15c; (s) per board; (t) to 16.50; (u) includes sacks.

British Development in Oxy-Chloride Cements

SEAMLESS FLOORINGS prepared from special magnesium oxy-chloride cements of the Sorel type have never been extensively used in this country in ordinary residences, although they have been used to some extent in railway carriages, lifts, and public buildings.

This type of flooring, apart from being rather noisy to walk upon, has manifest advantages, and it is surprising to find this material so little used. A special report issued by the Building Research Board has to some extent explained this matter. This report gives particulars of careful investigations which have been made, these going to prove that the magnesium oxychloride employed in these cements causes them to corrode iron and steel rather rapidly.

The Building Research Board has, however, worked out a new process which will be of interest to chemical manufacturers, in that ferrous chloride is employed instead of magnesium chloride, and the resulting cement is noncorrosive. This investigation will be viewed by many with disfavor, as magnesium chloride is already quite difficult enough to dispose of. New applications of this material will therefore have to be found. —*Industrial and Engineering Chemistry.*

Market Prices of Cement Products

Concrete Block

Prices given are net per unit, f.o.b. plant or nearest shipping point

City of shipping point	Sizes 8x8x16	8x10x16	8x12x16
Camden and Trenton, N. J.	.....	.19‡	.30‡
Columbus, Ohio	.16@.18a	.....	.....
Detroit, Mich.	16.00*	.....	26.00*
Forest Park, Ill.	18.00*	23.00*	30.00*
Grand Rapids, Mich.	.16	.....	.....
Graettinger, Iowa	.18@.20	.....	.....
Indianapolis, Ind.	.13@.15†	.....	.....
Los Angeles, Calif.¶	5¾x3½x12—50.00; 7¾x3½x12—60.00		
Oak Park, Ill.	.18@.21a	.....	.....
Somerset, Pa.	.20@.22	.....	.....
Yakima, Wash.	20.00*	.....	.....

*Price per 100 at plant. †Rock or panel face. (a) Face. ‡Delivered. ¶Price per 1000.

Cement Tile

Prices are net per sq. in carload lots, f.o.b. nearest shipping point unless otherwise stated.

Camden and Trenton, N. J.—8x12, per sq.	
Red	15.00
Green	18.00
Cement City, Mich. — 5"x8"x12", per M	55.00

Cicero, Ill.—Hawthorne tile, per sq.

	Chocolate Red and Orange	Yellow, Tan Green and Blue	Slate Gray
French and Spanish†	$11.50	$13.50	$12.75
Ridges	.25	.35	.30
Hips	.25	.35	.30
Hip starters	.50	.60	.60
Hip terminals, 2-way	1.25	1.50	1.50
Hip terminals, 4-way	4.25	5.00	5.00
Mansard terminals	2.50	3.00	3.00
Gable finials	1.25	1.50	1.50
Gable starters	.25	.35	.30
Gable finishers	.25	.35	.30
*End bands	.25	.35	.30
*Eave closers	.06	.08	.06
*Ridge closers	.05	.06	.05

*Used only with Spanish tile. †Price per square.

Chicago, Ill.—per sq.	20.00
Detroit, Mich., per sq.:	
5x4x12	12.00
5x8x12	20.40
Grand Rapids, Mich.:	Per 1000
5x8x12	70.00
Graettinger, Iowa: Cement tile per 100 ft.	
5-in	4.50
6-in	5.60
8-in.	9.00
10-in.	12.00
12-in.	17.50
14-in.	25.00
16-in.	35.00
18-in.	45.00
20-in.	60.00
22-in.	70.00
24-in.	80.00
30-in.	100.00
Houston, Texas.—Roofing Tile, per sq.	
Red	17.00
Green	19.50
5x4x12 (Lightweight)	45.00
5x8x12 (Lightweight)	80.00
Indianapolis, Ind.—9"x15"	
Gray	10.00
Red	11.00
Green	13.00
Longview, Wash.—(Stone Tile)	Per 1000
4x6x12	55.00
4x8x12	65.00
Mt. Pleasant, N. Y.:	Per 1000
5x8x12	78.00
Pasadena, Calif.:	Per 1000
4x4x12	$30.00
4x6x12	50.00
4x6x12	55.00
Tacoma, Wash.—Drain tile per ft.:	
3 in.	.04
4 in.	.05
6 in.	.07½
8 in.	.10
Waco, Texas:	Per sq.
4x4	.60
Wildasin Spur, Los Angeles, Calif:	
4x3½x12	.03½
6x3½12	.04½
8x3½x12	.05½
Yakima, Wash.:	
5x8x12	.10

Concrete Brick

Prices given per 1000 brick, f.o.b. plant or nearest shipping point.

	Common	Face
Appleton, Minn.	22.00	25.00@35.00
Baltimore, Md. (Del. according to quantity)	15.50	22.00@50.00
Camden and Trenton, N. J.	17.00	
Ensley, Ala. ("Slagtex")	14.50	22.50@33.50
Eugene, Ore.	25.00	35.00@75.00
Friesland, Wis.	22.00	32.00
Longview, Wash.	18.00	25.00@75.00
Milwaukee, Wis.	15.00	25.00@75.00
Mt. Pleasant, N. Y.		14.00@23.00
Omaha, Neb.	18.00	30.00@40.00
Pasadena, Calif.	12.50	
Philadelphia, Penn.	†15.25	‡21.50
Portland, Ore.	17.00	25.00@75.00
Prairie du Chien, Wis.	14.00	22.50
Rapid City, S. D.	18.00	25.00@40.00
Waco, Texas	16.50	32.50@125.00
Watertown, N. Y.	21.00	35.00
Wauwatosa, Wis.	14.00	20.00@42.00
Winnipeg, Man.	14.00	22.00
Yakima, Wash.	22.50	

†Gray. ‡Red.

Action of Silicate of Soda on Concrete Surfaces

SOME very interesting facts on the action of sodium silicate on concrete surfaces have been collected and published in a leaflet put out by the Philadelphia Quartz Co., Philadelphia, Penn.

Silicate of soda solution suitably diluted and applied to concrete surfaces, fills the surface pores with a solid material, which in time becomes insoluble. It probably also hardens the cement itself. The porous structure is thus strengthened and reinforced against wear and tear and the concrete rendered waterproof, dustproof and resistant to acids.

The silicate treatment is of value whenever it is applied to concrete. The best results are obtained when it is applied two to four weeks after the concrete has been laid, but even on very old concrete the silicate treatment has the hardening and filling effect.

U. S. Gypsum Company to Build Plant Near Detroit

A REPORT in the Detroit, Mich., *Free Press* states that the U. S. Gypsum Co., Chicago, Ill., is to build a plant on a 7-acre site located on the banks of River Rouge. Construction of the new plant to be built at a cost of $550,000 with equipment, it is said, will begin in a short time.

Current Prices Cement Pipe

Prices are net per foot f.o.b. cities or nearest shipping point in carload lots unless otherwise noted.

Culvert and Sewer	4 in.	6 in.	8 in.	10 in.	12 in.	15 in.	18 in.	20 in.	22 in.	24 in.	27 in.	30 in.	36 in.	42 in.	48 in.	54 in.	60 in.
Detroit, Mich.									$16.00 per ton								
Graettinger, Iowa	.04½d	.05½	.08½	.13	.17½	.....	.50	.60	.75	.85	.....	.....	.....	.....	.....	.....	.....
G'd Rapids, Mich. (b)	.....	.....	.....	.60	.72	1.00	1.28	.....	.....	1.92	2.32	3.00	4.00	5.00	6.00	.....	.....
Houston, Texas	.....	.19	.24	.43	.55½	.90	1.30	.....	†1.70	2.20	.....	.....	.....	.....	.....	.....	.....
Indianapolis, Ind. (a)	.....	.....	.....	.80	.90	1.10	1.30	.....	.....	1.70	.....	2.70	.....	.....	.....	.....	.....
Longview, Wash.							Sewer pipe 40% off list, culvert—list										
Mankato, Minn. (b)	.....	.....	.....	.....	.....	.....	.....	.....	.....	1.50	1.75	2.50	3.25	4.25	.....	.....	.....
Mt. Pleasant, N. Y.	.....	.17	.26	.39	.50	.68	.93	1.29	.....	1.67	.....	.....	.....	.....	.....	.....	.....
Norfolk, Neb. (b)	.....	.....	.....	.90	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Paullina, Iowa‡	.....	.....	.....	.....	.....	.....	.....	2.25	.....	2.11	.....	2.75	3.58	.....	6.14	.....	7.78
Somerset, Pa.	.....	.....	.....	.....	80[1]	1.00[2]	1.40[3]	.....	.....	2.00[4]	.....	3.25[5]	4.00[6]	6.00[7]	.....	.....	.....
Tacoma, Wash.	.15	.18	.22½	.30	.40	.55	.80	.....	.....	.....	.....	.....	.....	.....	.....	.....	.....
Tiskilwa, Ill. (rein.) (a)	.....	.....	.....	.65	.75	.85	1.10	1.60	.....	1.90	.....	.....	3.40	.....	.....	.....	.....
Wahoo, Neb. (b)	.....	.....	.....	.....	1.00	1.13	1.42	.....	.....	2.11	.....	2.75	3.58	4.62	6.14	6.96	7.78
Waukesha, Wis.								All sizes $9.00 per ton									
Yakima, Wash.								$10.00 per ton									

*30-in. lengths up to 27-in. diam., 48-in. lengths after; (a) 24-in. lengths; (b) Reinforced; (c) Interlocking bar reinforced. †21-in. diam. ‡Price per 2 ft. length. (d) 5 in. diam. [1]@1.08. [2]@1.25. [3]@1.65. [4]@2.50. [5]@3.85. [6]@5.00. [7]@7.50.

Plan Merger of Sand Companies

ACCORDING to the Topeka, Kans., *Capital,* tentative plans for the consolidation of several sand and gravel companies in Missouri, Oklahoma and Kansas have been completed. The companies to enter the merger are said to represent about 10% of the production in these states. The consolidation will involve $10,000,000 in tangible assets, it was stated.

Leaders in the merger plan stated that the consolidation will result in lower prices to the consumer because of the saving to be effected in overhead expense and in freight rates resulting from elimination of cross shipment, such as the sending by a Topeka firm of cars of sand into a territory served by a Kansas City firm.

Sand, according to members of the combine, is perhaps the only commodity on which the freight rates always are greater than the value of the sand.

Increased rigidity of government requirements have made machinery obsolete which was new five years ago and has increased the cost of production.

Through the buying power made possible by the combination production will be improved and will be made more economical, members say.

An effort will be made to rush through details of the consolidation. It is hoped to have it completed within the next few months when offices to handle the business of the companies concerned will be opened, either in Kansas City or Topeka.

A second factor considered in attempting an early completion of the consolidation is a Kansas building program which in 1926 will, it is estimated, total $10,000,000. Most of this program involves the purchase of sand.

The leaders in the consolidation plan are: F. A. Laughead, of the Topeka Sand Co.; G. E. Williamson, of the Tulsa Sand Co.; C. W. Adams, of the Hunt Engineering Co.; D. L. Denise, of the Topeka Sand Co., and A. N. McQuoin, of the Empire Sand and Material Co., of Wichita.

Lyman-Richey Sand Company Adds to Holdings

ACCORDING to the Fremont, Neb., *Tribune,* the Platte Valley Sand and Gravel Co., Schuyler, Neb., has been sold by its owner, John C. Ehrenberger, to the Lyman-Richey Sand Co., Omaha, Neb.

Unconfirmed rumor has it that the consideration for the 100 acres of land was at the rate of $300 per acre and the machinery to be invoiced. The report also states that Mr. Ehrenberger has contracted to remain with the purchasing company for a period of seven years.

This pit, although having been operated only a short while, has gained quite a reputation as to the quality of gravel produced and the owner has landed several good sized contracts.

V. P. Ahearn Appointed Acting Secretary of National Sand and Gravel Association

PRESIDENT HUGH HADDOW, JR., of the National Sand and Gravel Association, has made the following announcement, dated March 5, 1926:

V. P. Ahearn

A meeting of the executive committee was held on February 25, at the Auditorium hotel, Chicago, Ill., at which action was taken as follows:

V. P. Ahearn was appointed acting executive secretary and editor of *The Bulletin* in place of our former executive secretary, T. R. Barrows, who, as you already know, died at Atlanta, Ga., on January 31. The death of Mr. Barrows so soon after our tenth annual convention in Atlanta was a great shock to the whole membership of our association. The executive committee knows very well that in the death of Mr. Barrows, we have sustained a loss which is very great, as Mr. Barrows has been a big factor in our success during the years he was with us.

However, we feel that the association was not left entirely destitute of good executive material, for we have two men in the Washington office who are heart and soul in their work and are qualified, willing and able to step into the breach.

In appointing Mr. Ahearn to the position of acting executive secretary, we feel that two things have been assured: First, the continuance of the policies of the association formulated during the administration of Mr. Barrows; second, we feel that we have been able to recognize and reward the long and faithful services of Mr. Ahearn.

Mr. Ahearn came with the association in March, 1921, as assistant to E. Guy Sutton, who was then executive secretary. He held the same position throughout the whole term of office of Mr. Barrows.

Mr. Ahearn is known to all members of the association who have ever visited the Washington office or attended our annual conventions. He is thoroughly conversant with the desires of the executive committee that the Washington office serve the members in any and all matters where help can be rendered.

The executive committee feels that with Mr. Ahearn and Stanton Walker we have two men who are willing and who will render valuable service to our members.

We hope that the membership will continue to avail themselves of the facilities for personal services offered by the Washington office of the association, and we are sure that each request for such service will receive the same prompt and efficient attention as heretofore.

West Virginia Gravel Companies Form Sales Firm

FORMATION of a sales organization with authorized capital of $100,000, to be known as the Huntington Gravel and Supply Co., and of which executives of the Wilson Sand and Supply Co. and the Union Sand and Gravel Co. are principal officers, was announced recently in the Huntington (W. Va.) *Advertiser.*

Under the operating arrangement established for the new company, it was explained, all of the Ohio river sands and gravels produced by the Wilson Sand Supply Co. and the Union Sand and Gravel Co. will be marketed by the newly formed organization, which is to act as distributor for the two parent companies.

A fleet of 25 trucks owned by the Wilson and Union companies will be taken over and operated in the city and suburban territory by the new distributing company.

Distribution of sand, gravel and cement in carloads heretofore marketed by the two parent companies will also be continued by the new organization.

The office of the new company, it was announced, will be under the immediate direction of G. W. Sullivan, sales manager, and Wood Bouldin, assistant secretary, with supervision by other officers of the company.

The Wilson and Union companies are among the largest producers of sand and gravel in the Ohio valley. The Union Concrete Pipe Co. is closely associated with the Union Sand and Gravel Co. organization. Its offices and works are located at Ceredo.

The new company does not contemplate any new construction in the immediate future, it was stated.

The purpose of the new company, it was explained by Mr. Rawn, its president, is to eliminate waste and to improve distribution methods and service to the consumer.

At the organization meeting of the new company the following were elected officers: A. B. Rawn, vice-president of the Wilson Sand and Supply Co., president; J. L. Richmond, treasurer of the Union Sand and Gravel Co., vice-president; H. A. Sholze, treasurer of the Union Concrete Pipe Co., treasurer; G. A. Northcott, president of the Wilson Sand and Supply Co., secretary, and Wood Bouldin, formerly auditor of the Kingston Pocahontas Coal Co., assistant secretary.

New Machinery and Equipment

New Crawler Loader

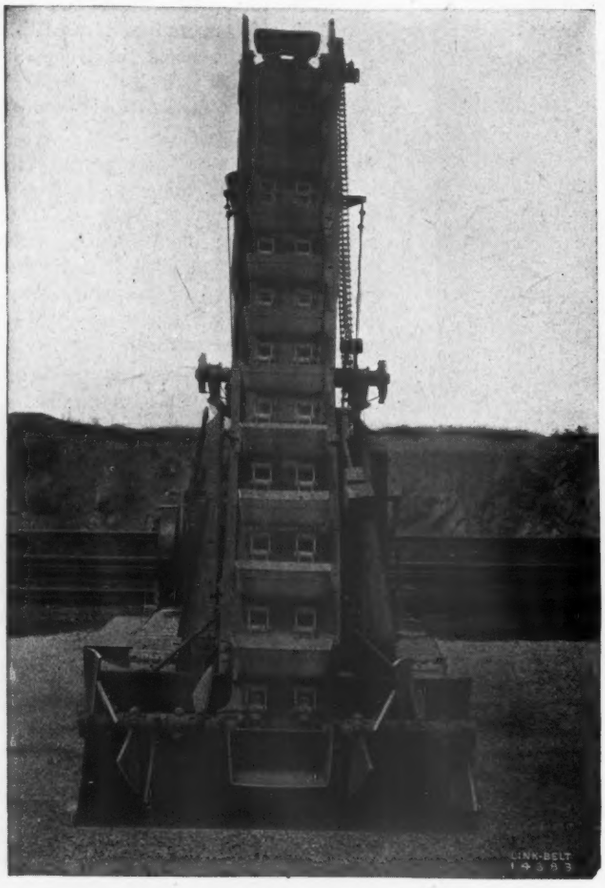
A NEW crawler loader has just been announced by the Link-Belt Co. of Chicago, Ill.

Designed and built within the Link-Belt organization, this machine is said to handle crushed stone, gravel, sand, phosphate and like materials at the rate of 140 tons per average hour and to require only one man for operation.

Four units compose the loader, i.e., the elevator, the chassis, the power plant, and the crawler; the unit system of construction is said to enable the operator to inspect the machine easily, and to make any adjustment or repair without tearing the whole machine apart.

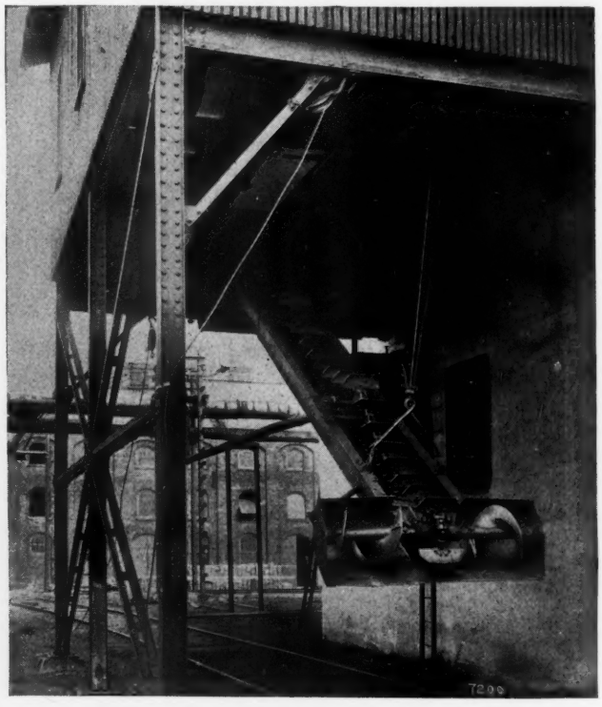
All moving parts are provided with Alemite fittings or grease cups placed within reach of the operator. All bearings and moving parts are said to be large enough to keep wear to a minimum, and give longer life to the loader.

The makers of the loader assert that anyone can learn to operate it with but a few minutes' instructions. It can travel forward

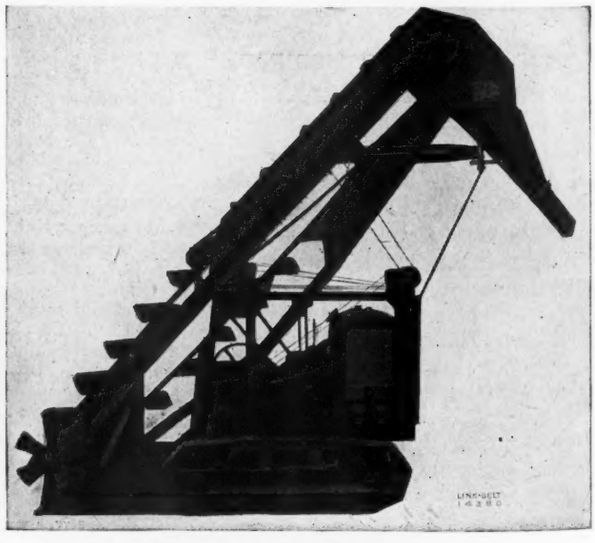


Front view of crawler loader, showing elevator

Close-up view of loader handling crushed stone



View of type of adjustable car loader equipped with screw type of feeder, in use in 1905



View of other side of loader

and reverse; and turn right or left when traveling in either direction. The starting, turning, and stopping of the loader is all controlled by two hand levers, which automatically apply brakes when stopping. The elevator is controlled by separate hand lever, which operates a steel clutch, and disengages automatically when machine is started in reverse.

The buckets used on the elevator are of special design with reinforced edges closely spaced on double strands of malleable iron and steel chain.

Head and foot sprockets are made of manganese steel cast in two parts and clamped on hexagonal steel shafts which are journaled and run in babbitted bearings, oil-grooved, and provided with Alemite fittings. The driving wheel on elevator head shaft is provided with a safety breaking pin. The chute at the head of the elevator, as ordinarily furnished, is of the swiveling type. It operates through an angle of 180 deg. and can be controlled from the operator's platform. The feeder consists of manganese steel paddles bolted to the hexagonal steel foot shaft. Feeder adjustment and collapsing mechanism are both controlled by a hand wheel within reach of the operator.

The chassis is said to be made of heavy angles, plate and channels riveted together. The rear of the chassis is supported on a steel bracket casting, which is pinned to the rear axle.

The power plant is a gasoline power unit of 30 hp. at 1200 r.p.m., equipped with a governor; or electric motor equipment to suit the conditions. The truck transmission has three speeds, giving a speed of 33 ft. per minute or 66 ft. per minute in the forward direction, and 29 ft. in the reverse.

The machinery housing is said to be a specially designed unit, housing all driving and control machinery for crawler and tractor.

New Large Capacity Power Shovel

BUCYRUS CO., South Milwaukee, Wis., announces another new shovel, the 100-B, a 3-yd. full-revolving shovel for rock products quarry and pit operation and general use.

It is a companion machine to the Bucyrus 120-B 4-yd. full-revolving shovel, mounted on single truck caterpillars, and is said to combine in a general utility machine, the strength and power of the railroad type shovel with the mobility and handiness of the small revolving shovel. The manufacturers claim the following advantages for the new shovel:

It has all the speed of action of the railroad type, with bigger dipper capacity—3 cu. yd.—the strength for continuous work in the heaviest digging, the power for big output in any sort of digging, the single part hoist for fast work in rock excavation and extraordinary fast digging in lighter work, the full revolving swing which allows it to dig or dump anywhere in a full circle, and the mobility of single truck caterpillars, permitting the shovel to maneuver in or out of odd corners rapidly under its own power. The over-all length is short, so that the shovel can work in close quarters.

The caterpillars are of the rigid type. There is one wide, full length unit on either side of the machine. The base is one single steel casting.

The roller circle revolves upon high carbon renewable steel bars, fitted into the revolving frame and rack castings.

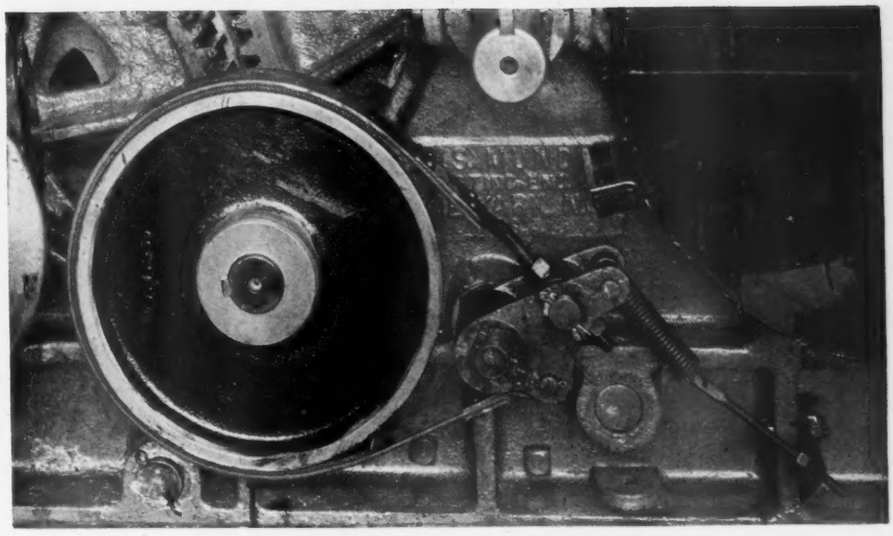
The revolving frame consists of two pin-connected steel castings, shipped with all the machinery mounted. The unit is held within railroad clearances.

A single part hoist is used which is claimed to be the fastest and most efficient way of getting power to the dipper.

The boom is of heavy box-girder construction, 29 ft. 6 in. in length, with heavy steel boom-foot castings bolted and welded to the structural steel.

The dipper handles are armored wood and racks and pinions are special steel.

The power is either steam or electric.



Automatic brake for gasoline and electric hoists

New Automatic Hoisting Brake

THE Mundy Hoisting Engine Co., Newark, N. J., announces the design of a new automatic brake, which is to be built on all future gasoline and electrically driven hoists. This brake consists of a rim wheel keyed on the intermittent shaft of the hoist, upon which an asbestos lined brake is mounted.

The differential spool and spring mechanism shown in the photograph causes the brake to grip the wheel so that it is impossible for the load to descend or the drum shaft to reverse. This brake has been thoroughly tested, it is claimed, and was found to hold instantly the rated load without slipping. When the rim wheel is revolving in the hoisting direction, the automatic brake idles.

New large capacity full revolving shovel mounted on caterpillars

Canadian Cement Output for 1925 Shows Slight Increase Over 1924

THE Canadian mill output of cement during 1925 was 7,869,946 bbl., an increase of 101,294 bbl. over the 1924 total. Shipments for the year showed an appreciable advance and totalled 8,116,597 bbl., valued at $14,046,704, according to the preliminary report on the mineral production of Canada, issued by the Dominion Bureau of Statistics, at Ottawa, Ont.

Cement is produced in Quebec, Ontario, Manitoba, Alberta and British Columbia. There was formerly a production of puzzuolanic cement from blast furnace slag in Nova Scotia, but this has been discontinued in recent years. In 1925, Ontario was the leading producer, sales in that province amounting to 3,462,359 bbl., valued at $5,253,911. While slightly below the total quantity for Ontario, sales from Quebec mills amounted to 3,365,802 bbl. Higher prices prevailed in Quebec than in Ontario. Thus it was that sales from Quebec mills reached a greater value, at $5,689,991.

British Columbia mills sold 485,185 bbl. for $1,151,344, and Manitoba came next with 407,395 bbl., worth $1,037,929. Alberta sales totalled 395,857 bbl., at $913,529.

By provinces, the average selling price per barrel, f.o.b. plant, was as follows: Quebec, $1.69; Ontario. $1.52; Manitoba, $2.55; Alberta, $2.31, and British Columbia, $2.37.

Cement consumption in Canada during the year was considerably lower than in 1924. In comparison with 1913, the year's consumption showed a decrease of 19.9%.

Importations for 1925 amounted to 21,849 bbl., averaging $2.89 per barrel as against an average of $2.50 in 1924. Exports of portland cement totalled 997,915 bbl., invoiced at $1,498,495.

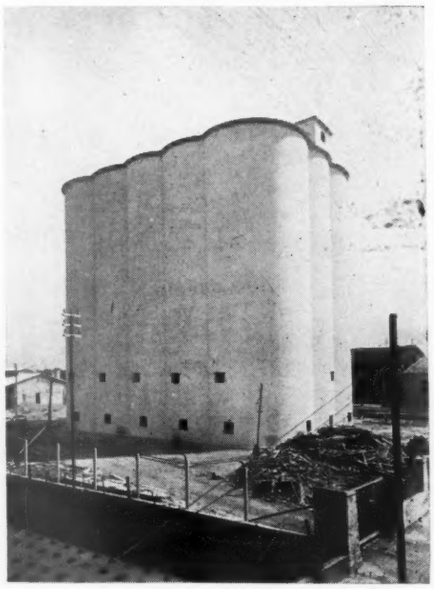
Russian Cement Output

PLANS for the cement industry of the Soviet Union for the current fiscal year ending September 1 next call for a total output of 9,000,000 bbl., equal to the output of 1913, according to a report of the industry received by the Russian Information Bureau. Production rose rapidly from the low point of 534,000 bbl. in the fiscal year 1921-22, to 3,960,000 bbl. during 1924-25. Thirty-three factories are now working, as compared to fifty before the war. The present equipment is considered adequate to cover an increase in the annual output to 13,000,000 bbl. during the next few years. Demand is growing rapidly and the present price is 140 per cent of the pre-war price.

Exports of Soviet cement last year aggregated 30,078 metric tons, about five times the pre-war average. The export was almost wholly to the Near Eastern countries and Persia.—*Russian Information Bureau.*

New Packhouse for International's Argentine Plant Just Completed

WHAT has been termed the most rapid piece of construction work ever carried forward in Argentine, if not in all South America, was just recently completed at Avellaneda, in the province of Buenos Aires.



New Argentina packhouse of International Cement Corp.

In seven days six huge silos, each 90 ft. high, with a total base area of 6338 sq. ft. were erected.

The silos are part of a packing unit being erected for the Argentine Portland Cement Co., subsidiary of the International Cement Co. of New York. Storage will be provided for 425,000 sacks of cement. These new storage silos are intended to relieve the pressure upon the railroad during the months of heavy crop movement and assure uninterrupted cement service. The silos and packhouse have been so constructed that they can be made an integral part of a new mill, if conditions in this progressive country call for such expansion.

The construction of the silos was done by the MacDonald Engineering Co. of Chicago, Ill.

Cement Plants in India Fail

ACCORDING to recent reports from Indian newspapers the Madras Portland Cement Works, Madras, India, has been declared bankrupt and the assets and property offered for sale by the trustees. This company is the oldest cement manufacturing company in India and produced about 50 bbl. per day. A receiver has been also asked for the Central Provinces Portland Cement Co., Kymore, India. This company operates a modern plant, built by G. L. Austin, general manager of the company, along plans furnished by Masted and Knott, London, England. It is the largest cement plant in Asia, selling 45% of the cement used in India. Although designed for producing 2200 bbl. per day, the plant has never run to capacity for the potential production in India is about twice the demand for cement. However the plant has been in continuous operation since it started over two and one-half years ago.

The plant equipment came mostly from American concerns and consists in part of two Bucyrus shovels, one Erie shovel, three Baldwin locomotives, Ingersoll-Rand air compressors and drills, Western dump cars, Koppel quarry cars and Allis-Chalmers gyratory crushers and roll mills. The wet mills, slurry agitators, pumps, kilns, sacking machinery, etc., were furnished by F. L. Smidth Co.

The personnel of the Central Provinces Co. consist of G. L. Austin, general manager, who built and operated the first rotary kiln cement plant in Japan; C. E. Hogg, chemist; J. S. Lack, engineer, and F. C. Stuart, kiln superintendent.

Olympic Portland Purchases International Lime Properties

THE Olympic Portland Cement Co., Ltd., Seattle, Wash., has purchased all the properties of the International Lime Co., Sumas, Wash. The holdings acquired consist of 460 acres, of which 80 have been worked by the International company for the past 15 years. This acquisition gives the cement company 1200 acres of land, including 160 acres of lime rock deposits, in the Kendall region. The holdings of the lime company adjoined the quarry properties of the cement interests, whose quarry is located at Balfour and from which it has been drawing its limestone.

The transfer of the lime company's possessions presages further expansion on the part of the Olympic Portland Cement Co., which is now adding a kiln to its Bellingham plant. Superintendent A. F. Krabbe says that the company plans to build upon the property purchased a large crushing plant. It may cost $40,000 or $50,000, he stated, and it will have a daily capacity of 1000 tons as compared with a daily capacity of 600 tons for the Balfour plant. The engineering work, an essential preliminary to this improvement, will be done this year.

The Olympic company will operate the lime plant acquired until all orders for material have been filled and then it is said that production and manufacture will be discontinued. At a later date, according to Mr. Krabbe, it may again be operated as a lime plant.

The International Lime Co. operated four 7½x36-ft. kilns and produced about 60,000 tons of lump lime and 11,000 of hydrated lime per year. W. D. Demorest was general manager of the plant and also treasurer of the company.—*Bellingham (Wash.) Herald.*

Plans for Large Quarry Merger Almost Complete

REPORTS of the negotiation of plans for the organization of the Indiana Limestone Quarry Corp. with a total capital of $40,000,000 through the amalgamation of the largest stone quarry interests operating in the Bedford-Bloomington district, were verified recently by Lawrence H. Whiting, president of the Boulevard Bridge Bank of Chicago.

Mr. Whiting said that 18 of the 38 companies operating quarries in Monroe and Lawrence counties, Indiana, will be included in the merger. With the exception of two of the companies all are members of the Indiana Limestone Quarrymen's Association, of which Thomas J. Vernia of the Indiana Quarries Co. is president.

"Some of the quarry interests in the Bloomington-Bedford district have been producing Indiana limestone since 1855," said Mr. Whiting, "and it is a fair estimate to say that they produce 31% of the cut stone used in the United States. A survey shows that at the present rate of depletion the supply of stone is sufficient to last more than 200 years."

Mr. Whiting said that the amalgamation was purely for economical reasons. He declined to make known who will be the officers of the corporation, but mentioned the Indiana Quarries Co., Consolidated Stone Co., W. B. McMillan and Son, Shea-Donnelly and Co., Furst-Kerber Cut Stone Co., and others, as interested in the merger. It was reported that the interested firm already have taken options on some of the quarries and mills in the district mentioned. Headquarters will be at Bedford, Ind.—*Chicago Journal of Commerce.*

Granville Quarry Case Dismissed

A DECISION regarded as important to the quarrying industries has just been handed down by Supreme Court Justice Christopher J. Heffernan of New York in the action of Griffth Humphrey of Middle Granville, N. Y., against the Sheldon Slate Products Co. The suit was for an alleged nuisance and trespass. The court for the defendants, holding that there was not a nuisance maintained nor was there a trespass. The case was heard by Justice Heffernan without a jury.

The defendant corporation is engaged in the operation of a slate quarry in the town of Granville and the quarry has been operated for eight years. Mr. Humphrey is the owner of a farm adjoining the quarry and his dwelling house is located near the quarry. He bought the property in 1923, and since moving there, he contended the defendant in the operation of the quarry used large quantities of dynamite and explosives and the resulting explosions caused vibration and disturbance so that the foundation walls of his house were undermined.

Justice Heffernan ruled that although the operation of the slate company's quarry causes vibration of the plaintiff's house, this does not entitle him to maintain the action.

As no negligence has been established on the part of the defendant, I cannot see from the proof shown that the use which the defendant makes of his property is not reasonable, the court ruled.

There is no proof that the defendant is responsible for the presence of large stones similar to those used in the quarry which were found in the yard of the plaintiff, the justice added.

For these reasons Justice Heffernan has dismissed the complaint on the merits, with costs.—*Albany (N. Y.) Knickerbocker-Press.*

First Shipments of Florida Phosphate to Australia

A NEW foreign market has been opened for the Florida hard rock phosphate industry. On its maiden trip, the Norwegian freighter *Austavard,* a modern electrically propelled vessel, sailed from Fernandina, Fla., recently with a full cargo of 6200 tons of crushed rock phosphate for Australia.

This is the first shipment of phosphate to be made from Florida to the Australian continent and the development of that market, it is believed, will prove a tremendous boost to the industry in this state.

Hard rock phosphate is brought to Fernandina in large quantities from the mines in the central portion of Florida. Here it is dried and crushed in the plant of the Florida Terminal Co. and exported to Germany, Holland, England and other European countries, where there is a steady demand for it.—*Tampa (Fla.) Tribune.*

Oakland Ordinance Requires Bond for Blasting

A NEW ordinance regulating blasting operations in the city of Oakland, Calif., has just been passed by the city council, following frequent complaints.

No blasting will be allowed hereafter except through a written permit from the superintendent of streets. The permit will cost $1. Those blasting must put up a $1000 bond to cover all possible damage. Evasion of the ordinance will bring a $500 fine.

United States Gypsum Doubles Capacity of Sweetwater Plant

PRODUCTION of the United States Gypsum Co.'s plant at Sweetwater, Texas, has been doubled by the construction of a new mill, which was placed in service there for the first time recently. A day and a night shift are being operated to keep up with the Southwest's demand for building materials.—*Dallas (Texas) News.*

Magnesite in 1925

STATISTICS compiled by the United States Bureau of Mines, show that the production of crude magnesite, mined in the United States in 1925, was 120,660 net tons, valued at $1,432,700. Six operators at seven mines in four counties in California produced 64,600 tons of magnesite, valued at $872,100, all of whom reported only fair business, due to foreign competition. All of the output in Washington was from the mines of one magnesite company, which operated only one of its six furnaces at Chewelah, Stevens county. In 1924, the domestic output was 120,100 tons and in 1920 it was 303,767 tons.

Imports of magnesite in 1925 were 143,440 tons compared with 148,700 tons in 1924 and 63,110 tons in 1920.

From a tabulation of the best information available the total production of crude magnesite from California mines from the beginning of the industry in 1886 to 1925, inclusive, 40 years, has been 1,041,450 tons, valued at $10,146,640. Washington, since the beginning of mining in 1916, has produced 764,610 tons, valued at $5,111,850. The total production of crude magnesite produced in the United States for the same 40 years is 1,806,060 tons, valued at $15,258,490.

Moline Consumers Company Acquires New Plant

THE Moline Consumers' Co. has taken over the Pike County Sand and Gravel Co., Louisiana, Mo., and will spend in the neighborhood of $50,000 in rebuilding and enlarging the plant there. The Moline company operates plants at Moline and Ottawa, Ill., producing about 200,000 cu. yd. of washed and graded bank, pit and river sand and gravel per year.—*Rock Island (Ill.) Argus.*

International Cement Adds Fourth Kiln to Cuba Plant

A STEADY increase in the demand for "El Morro" cement has made it necessary for the Cuban Portland Cement Corp., International Cement Co.'s Cuba subsidiary, to install a fourth kiln and cooler in the plant at Mariel. When the installation of additional grinding units is completed, the capacity of the plant will be increased 33⅓%, making possible the production of 4000 bbl. of cement a day.

The new kiln is 172 ft. 6 in. long and 10 ft. in diameter. The kiln is installed at a pitch of ⅜ of an inch to the foot. The cooler is 54 ft. 6 in. long, has one section 8 ft. in diameter and another 7 ft.

The new kiln was installed in what is believed to be record time—only nineteen days elapsing from the time the kiln and cooler reached the plant at Mariel until the installation was entirely completed. This time is the more unusual in view of the fact that the machinery was shipped "knocked-down" and had to be assembled before erection.

News of All the Industry

Incorporations

Federal Gravel Co., Saginaw, Mich., $210,000.

Interstate Sand and Gravel Co., Wilmington, Del., $150,000. F. L. Mettler, Wilmington, Del.

Micolithic Co. of Texas, Houston, Tex., $50,000. Rawle Buckner, Joseph A. Daniel and others.

Universal Gypsum Co., Chicago, Ill. Capital stock increased from $24,000,000 to $34,000,000.

Oakfield Gypsum Products Corp., Oakfield, N. Y. Increased capital from $300,000 to $1,000,000.

Lincoln Concrete Block Co., Lincoln, Neb., $25,000. H. W. Andrews, T. Snyder, C. A. Gately and others.

Transit Concrete Co., Seattle, Wash., $10,000 Philip Meredith, G. E. Meredith, W. E. Smith and others.

Pellicer Grant Quarry Co., Daytona Beach, Fla., $25,000. W. H. Barnes, D. N. Phillips, and others.

Utah Phosphate Corp., Provo, Utah, $10,000. S. H. Belmont, Joseph Walkins, H. H. Harding and others.

Perrin Hampton Springs Sand Co., Chicago, Ill., $1,200,000. (Corporation Maintenance & Service Co.)

Buffalo Gravel Corp., Buffalo, N. Y., 3,000 to 110,000 shares of which 10,000 are $100 each. 100,000 common, no par.

Huntington Gravel & Supply Co., Huntington, W. Va., $100,000. L. L. Wilson, G. S. Neal, L. Davis, F. P. Slack and others.

Middletown Sand & Gravel Co., Middletown, Ohio, $50,000. R. D., J. R. and L. Stevens, J. S. Buchanan and D. W. Schaeffer.

Blanton Stone Co., Frankfort, Ky., $50,000. J. B. Blanton, J. R. Thompson, W. J. Sparks. To quarry, crush and deal in stone.

Dade City Cement Products Co., Dade City, Fla., F. E. Mertz, R. B. Sturkie and others. To manufacture cement brick and hollow tile.

Island Concrete Products Co., Oyster Bay, N. Y., $19,000. W. A. Hall, R. Hogg and F. M. Barkley. (Atty., O. Summers, Oyster Bay.)

White Sand and Gravel Co., Elkhart, Ind., $25,000. LeRoy White, Adelaide White and Elliott Crull. Sand and gravel, construction work, etc.

White Concrete Products Co., Elkhart, Ind., $30,000. LeRoy White, Adelaide White and Elliott Crull. Manufacture concrete blocks, bricks and tile.

Brazos Valley Development Co., Logansport, Ind. 5,000 shares, no par value. T. and J. W. Marshall and C. C. Alfred. To operate gravel pits, etc.

H. J. Nicholas Crusher Co., Kansas City, Mo., $25,000. H. J. and C. O. Nicholas and B. D. Davis. To manufacture, deal and sell crushed rock, stone and shale products.

A-One Cement Products Corp., New York, N. Y., $10,000. L. J. Kahan, O. Stolp and W. A. Vanness. (Attys., Vanness & Vanness, 220 Broadway, New York.)

El Monte Rock & Sand Co., Los Angeles, Calif., $50,000. Don C. Porter of South Pasadena; Edward P. Reed of Whittier; Wilford M. Taylor of El Monte; Paul D. Green and H. L. Traub of Los Angeles.

Atumba Minerals Corp., Brockton, Mass., $500,000; 10,000 preferred shares $10 each; 80,000 common shares $5 each. George L. Falk, Albert P. Baxendale, Ford and Cherry Sts., Brockton, and John F. Kedian.

Consolidated Cement Corp., Wilmington, Del., $20,000,000. 200,000 shares divided into two classes. Seven per cent cumulative preferred stock. 100,000 shares authorized of par value of $100 par share, amounting in the aggregate to $10,000,000, and 100,000 shares of common stock of no par value. (Corporation Trust Co. of America.)

Sand and Gravel

West Virginia Sand & Gravel Co. has recently put its new digger into service near Eight Mile Island in the Ohio river.

Rockton Molding Sand Co., Rockton, Ill., has opened a sales branch at 527 Roosevelt Road, Chicago. The new branch is to be known as the Manley Sand Co., and T. L. Manley will be in charge.

Alfred Sand & Gravel Co., Hornell, N. Y., at its recent annual stockholder's and director's meeting elected Frank W. Sterrett, president and treasurer. Mr. Sterrett was formerly secretary-treasurer and general manager and will continue his duties as general manager.

Rock Sand and Material Co., Little Rock, Ark., was enjoined by Chancellor John E. Martineau recently from staking or excavating on land located on the north bank of the Arkansas river upon petition of Mrs. Bettie Thomas and Southern Material and Construction Co. Title to the land is involved in the suit which has not been set for trial.

Deckers Creek Sand Co., Morgantown, W. Va., has been recently incorporated at that place and has purchased plant No. 2 of the Deckers Creek Stone and Sand Co. from the bond holders of that company. J. M. Strouss, who was appointed receiver of the latter company (see ROCK PRODUCTS, March 6, for details) is now general manager of the new company.

Quarries

Central Construction Co., Oakland, Calif., is soon to begin the construction of a crusher plant to cost $20,000, to be located on East Seminary Avenue, opposite 73rd Avenue.

Connell & Schultz have purchased what is known as the Barton limestone deposit at Williston, Fla., one of the largest deposits known. They will build a plant soon, which will be the seventh plant for the Williston district.

Newsome-Smith Lime Rock Co., Williston, Fla., has let the contract for the erection of a complete road materials crushing plant to the Maddox Foundry & Machine Co., Auber, Fla. The latter firm is also to build a plant of the same type for Jones, Herrick and Morten, Sarasota, Fla.

Cement

Hawkeye Portland Cement Co., Des Moines, Iowa, is to open an office in the Keeline Bldg., Omaha, Neb., with M. C. Brennan in charge.

National Cement Co., Montreal, Can., will put its third kiln into operation soon. The company will then be in full operation.

It is not anticipated that the maximum output of the plant will be reached until May or June—in the intervening time, all the machinery and equipment will be gradually tuned up to its highest efficiency.

Cement Products

Concrete Specialty Co., Kansas City, Mo., is planning a rear addition to its plant to cost about $20,000.

Concrete Products Co., Columbus, Ga., are adding cement tile and other products to their manufacturing operations.

Nel-Stone Co., San Antonio, Tex., plans to enlarge their plant at that place by adding another unit and additional machinery.

Roy Jones and **Alvin Bellamy** have engaged in the concrete products business in Montesano, Wash., as the Pacific Artstone Works.

Duntile Products Co., Baltimore, Md., are constructing additional factory space and installing new machinery so as to increase their output.

Rodney Houston has engaged in business at 10234 Hawthorne Avenue, Lennox, Inglewood, Calif., as the Inglewood Art Stone & Staff Co.

North Star Concrete Co. of Mankota, Minn., has purchased the plant of the Erickson Concrete Products Co. of Waseca, Minn., and also a number of patents owned by the company.

B. E. Thurston, who has been associated with W. A. Dehner in the management of the Concrete Products Co., Concordia, Kan., has sold his interest in the establishment to Mr. Dehner, who is now sole owner.

Geo. B. Newbold of the Shearman Concrete Pipe Co. and Fred L. Conner of the Murray Constructions Co. have acquired all interests of the Shearman Concrete Pipe Co., and incorporated a new company under the name of the Shearman Concrete Pipe Co., Inc.

The new owners are not planning any expansion at present except for installing new plants at Montgomery, Ala., and St. Augustine, Fla., in addition to the 11 plants already under operation by them.

Platte Valley Cement Tile Mfg. Co., Fremont, Neb., has purchased a plant site at East Omaha, Neb., and is to erect a plant for the manufacture of cement sewer pipe. The company, operating other plants at Fremont and North Bend, Ind., is under the management of G. F. Lille, who is also secretary.

Portland Cement Association representatives, at the invitation of the engineering department of the Alabama State Docks Commission, will give at Mobile a short course in design and control of concrete mixes. The course will start about March 22 and will last for two weeks. R. F. Leftwich, field engineer, will be in charge.

Lime

Alabama Lime & Stone Co., Birmingham, Ala., has awarded the contract for the kilns and hydrators for their new plant to be erected soon to the Schaffer Engineering Co., Pittsburgh, who will also be in charge of all engineering work.

Agricultural Limestone

Oregon State lime plant will be dismantled and moved from Gold Hill to Salem, Ore. It is planned to operate the plant at its new location by prison labor.

Gypsum

United States Gypsum Co., Chicago, Ill., has enlarged its holding at New York City by the purchase of the half block of river frontage adjoining their plant on the East river and 135th St. The property fronts 161.5 ft. on Locust Avenue, with a similar frontage overlooking the river. It extends 446 ft. along 135th Street and has a northerly line of 450 ft.

Sand-Lime Brick

Clayton Brick and Tile Co., Clayton, Iowa, manufacturers of sand lime brick and tile, will resume operations. Bernard F. Elsner has been retained as manager.

Slag

Buffalo Slag Co., Buffalo, N. Y., will not replace the recently burned plant at Erie, Pa., until early in 1927.

Magnesite

Edward Duryee, Los Angeles, Calif., who operates a magnesite deposit in Tulare County, Calif., is planning the establishment of a plant in Bakersfield, Calif., for the manufacture of magnesite products.

Personals

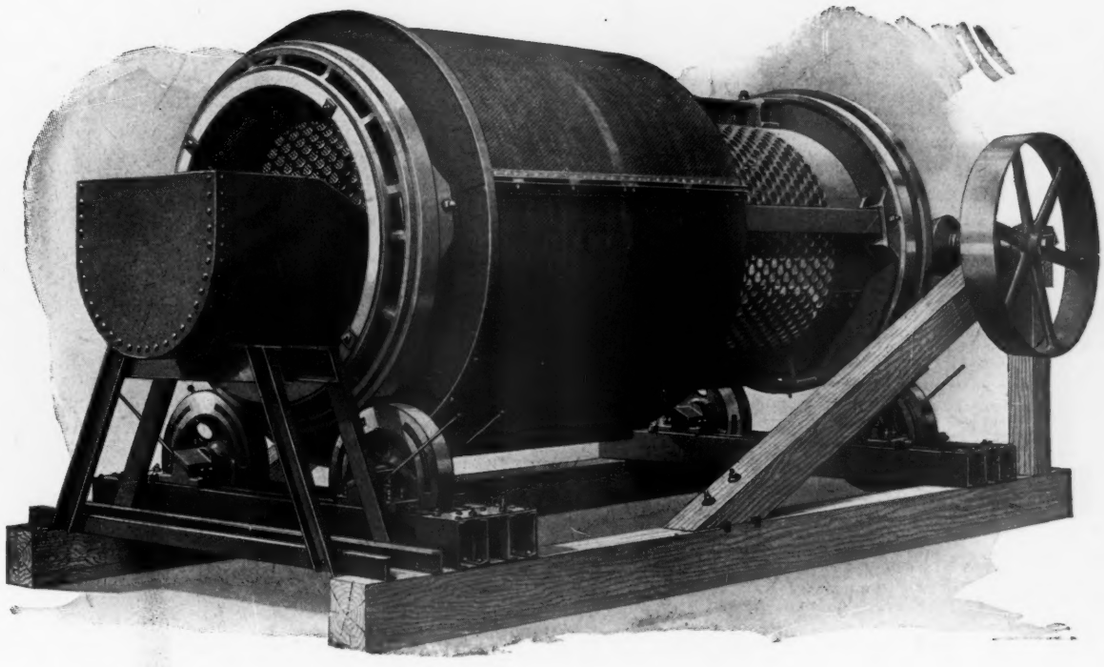
J. H. Whigham of the Roquemore Gravel Co., Montgomery, Ala., spoke on "Sand and Gravel" at the meeting of the Montgomery Builders' Exchange, held recently.

Henry Koch, president of the Koch Sand and Gravel Co. at Evansville, Ind., accompanied by his wife, has returned from a trip to Biloxi, Miss., where they spent several weeks.

William H. Kobbe, 50 East 41st St., New York, has increased his activities in the field of sulphur and its products. He has been recently retained by the Texas Gulf Sulphur Co. as a consultant.

C. F. Harris, Dallas, Tex., has been named as

Screening Equipment



To meet the requirements of modern rock crushing plant operators, Allis-Chalmers have designed and successfully installed their Style "B" Open End Revolving Screens.

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local manager of the Columbus Gravel Co.'s plant at Columbus, Miss., to succeed W. C. Robbins, who recently resigned to become associated with another gravel concern at Amory.

G. L. Austin, former general manager of the Central Province Portland Cement Co., Kymore, India, is on his way to the United States, after expiration of his present contract on February last. Mr. Austin will be located at Bellefontaine, Ohio, after May 15.

J. G. Johnson, Manitowoc, Wis., is back again as sales manager of the Valders Lime & Stone Co., Valders, Wis., after an absence of three years. Mr. Johnson was forced to retire temporarily because of a nervous breakdown and employed the intervening time visiting various lime plants throughout the country and studying sales conditions.

Thomas A. Rigby has recently been added to the Pittsburgh office of the McMyler Interstate Co., Cleveland, Ohio. Mr. Rigby has had a wide experience having been employed by the Canadian National Railways in laying out construction work and in reconstruction work on the water supply mains in Vancouver, B. C. On completion of this work he superintended various canal and grading contracts, involving general excavating and concrete work.

Obituaries

Samuel Lazarus, former president of the Acme Cement Plaster Co., St. Louis, Mo., was stricken with apoplexy recently while at luncheon at the Midday Club, New York, and died the following day at a nearby hospital to which he had been rushed.

Manufacturers

Colorado Iron Works Co., Denver, Colo., have removed their general offices from the plant to 1620-26 Seventeenth Street, Denver.

Thaleg and Hock, distributors of "The Tractorcrane" and manganese, alloy and steel castings and forgings, announces the opening of their office at 236 N. Clark Street, Chicago.

Gilman Manufacturing Co., East Boston, Mass., announces the appointment of the Colorado Iron Works Co. as exclusive Gilman agents in the Intermountain district which takes in Colorado, Utah, Wyoming, Nebraska and parts of neighboring states.

Climax Engineering Co., Clinton, Iowa, has appointed the following new dealers for Climax engines: H. Y. Smith Co., 1301 First National Bank Bldg., Milwaukee, Wis., for Milwaukee and eastern Wisconsin; A. K. Miller Engineering Co., Mobile, Ala., for southern Alabama and L. H. Staley, Whitney Bldg., New Orleans, for Louisiana.

America's Export Ratio of Industrial Machinery—In a general way, it has been recognized that American machinery manufacturers export perhaps 20% of their production, while British and European manufacturers generally export a much larger proportion. Ratios of this character necessarily fluctuate very widely from year to year, and certain returns have recently been made available by the Bureau of the Census which makes the following comparison possible. It is interesting to note that manufacturers of mining and quarrying machinery export a larger percentage of their output than manufacturers of any other type of machinery; which is outstanding proof of the international recognition of the United States leadership in developments in this field.

Mundy Sales Corp., New York, have appointed the following distributors for the Mundy line hoists: W. Fred Casey Co., Charlotte, N. C., for the state of North Carolina; Yancy Bros., Atlanta, Ga., for Georgia, Alabama, South Carolina and western Florida; Ernest Bros., Richmond, Va., for Virginia, and Franklin Taylor, West Palm Beach, Fla., for St. Lucie, Martin and Palm Beach counties, Florida.

Milwaukee Electric Crane and Manufacturing Corp. held their annual meeting recently and Andrew Montgomery was elected president of the corporation, with Henry S. Wright, industrial engineer, vice-president; Theodore Trecker, president of Kearney and Trecker Co., vice-president; A. J. Pitman, secretary-treasurer. These officers, together with Henry M. Thompson, compose the board of directors. Executives chosen for the year are as follows: Arthur Hempel, assistant general manager; Geo. R. Hoffman, chief engineer; Arthur Mayer, estimating engineer; Leo Mayer, chief draftsman; R. R. Sevenich, assistant secretary-treasurer; Arthur Lex, purchasing agent.

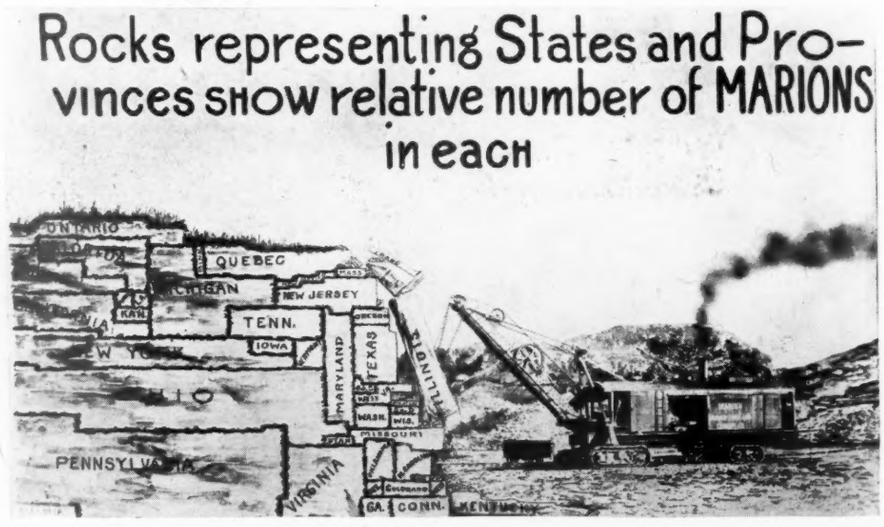
Trade Literature

The Story of the Quarry. Catalog No. 82 on blast hole drills. Traces history of churn drills from wooden drills first used to modern all steel drill. Contains much interesting information on different quarrying methods and practices and some semi-technical data on drilling and blasting. Illustrated throughout and description of machinery, tools, etc., used in drilling. ARMSTRONG MFG. CO., Waterloo, Iowa.

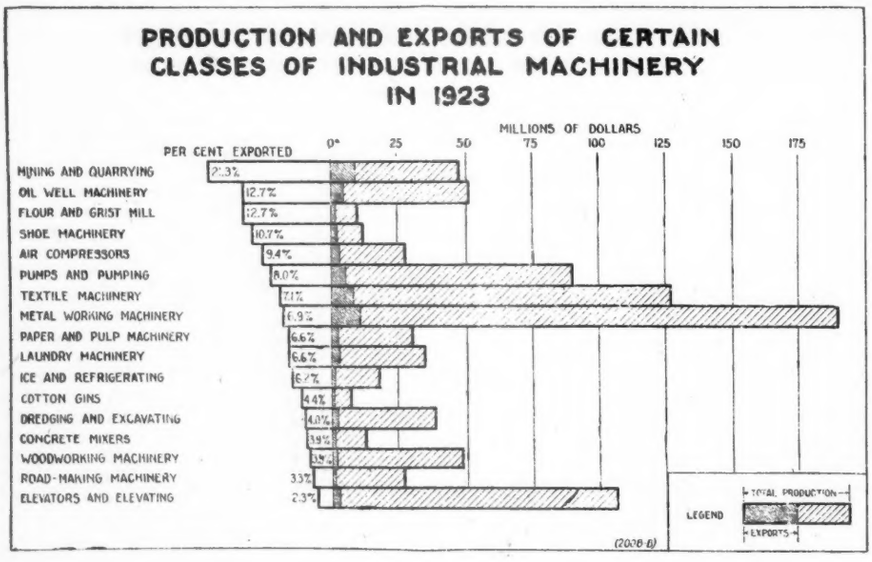
Motor Trucks. Illustrated bulletin on Republic trucks of various capacities. Shows details of construction and design. REPUBLIC MOTOR TRUCK CO., Alma, Mich.

Shovel Guessing Contest Prizes Awarded

ONE of the features of the recent convention of the National Crushed Stone Association at Montreal was a guessing contest inaugurated by the Marion Steam Shovel Co., Marion, Ohio. The delegates were asked to estimate the total number of Marion shovels in active use in rock products industries in the United States and Canada. To give the guessers an idea of what the total might be, a map (reproduced below) showing the relative proportions by state and province of the number of Marion shovels in each was posted. The winners of the contest and their prizes were as follows:



Map used to help guessers in estimating number of shovels



Charted production and exports of industrial machinery in 1923

First, Arthur S. Savage, Buffalo Crushed Stone Co., gold watch, chain and knife; second, F. H. Edwards, Commercial Quarries Co., Burbury overcoat; third, J. D. Hawthorne, General Crushed Stone Co., golf bag and golf sticks; fourth, R. J. Reigeluth, Connecticut Quarries Co., golf sweater and golf hose; fifth, C. W. Blakeslee, New Haven Trap Rock Co., pipe and pouch. The sixth and tenth prizes, fountain pen and pencil set, each went to A. J. Hooker, Buffalo Crushed Stone Co.; J. H. Adenbach, Dolomite Co.; L. J. Bennett, Buffalo Crushed Stone Co.; James Savage, Buffalo Crushed Stone Co.; W. U. McKeon, General Crushed Stone Co.

Mr. Edwards and Mr. Savage guessed the same number and tied for both first and second prize, but they flipped the coin and Mr. Savage held the unconditional honor.